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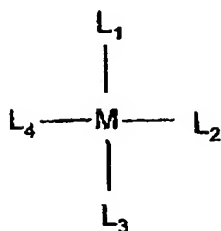


Fig. 1a

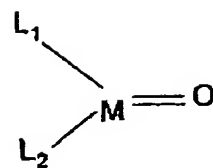


Fig. 1b

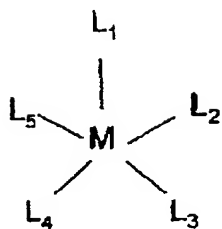


Fig. 1c

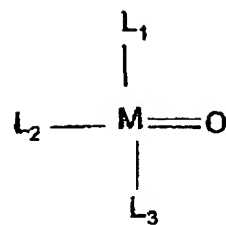
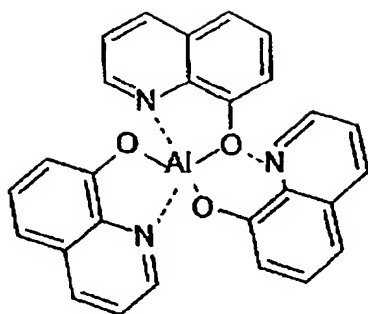
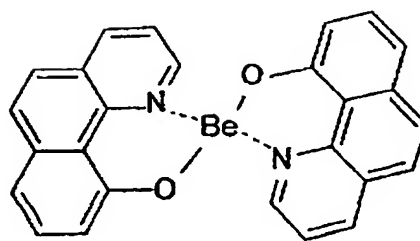


Fig. 1d

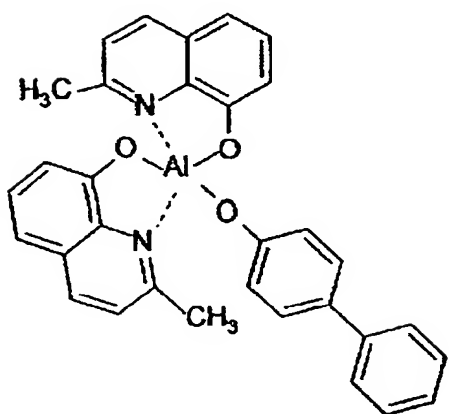
Fig. 1



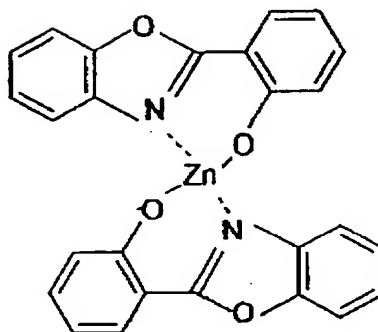
Alq



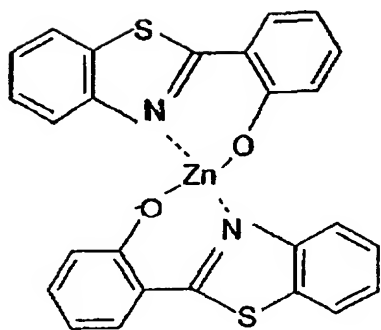
Bebq



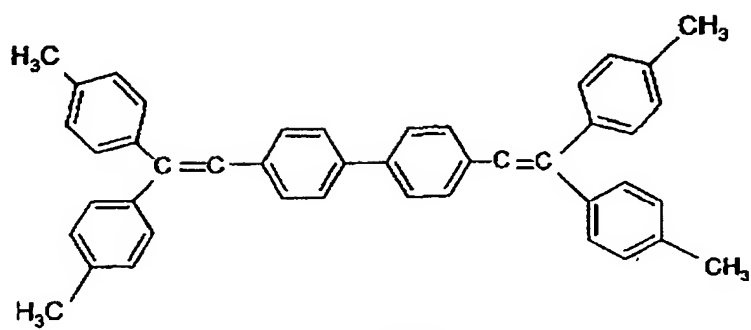
BAq1



ZnPBO



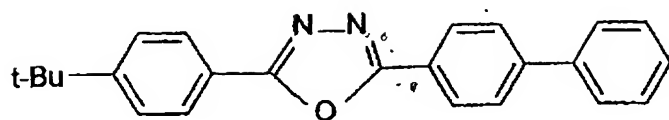
ZnPBT



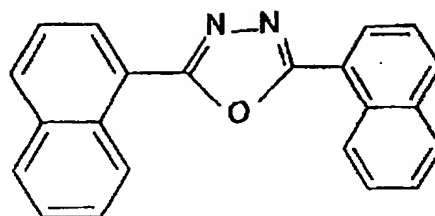
DTVb1

Fig. 2

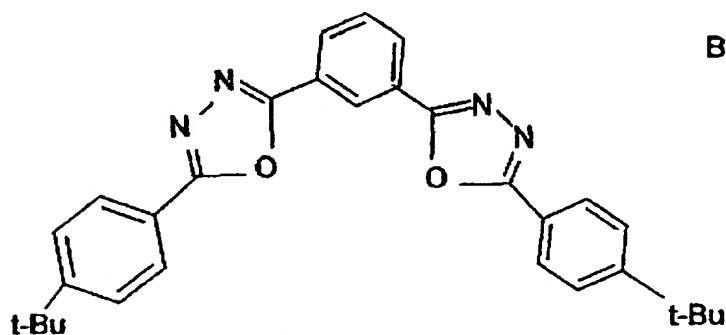
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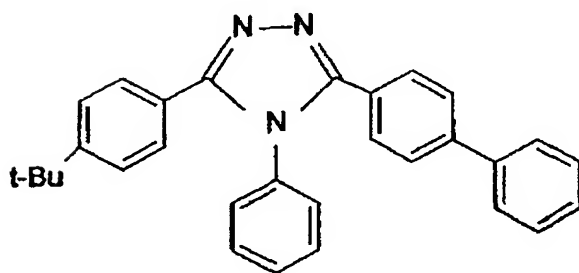
t-Bu-PBD



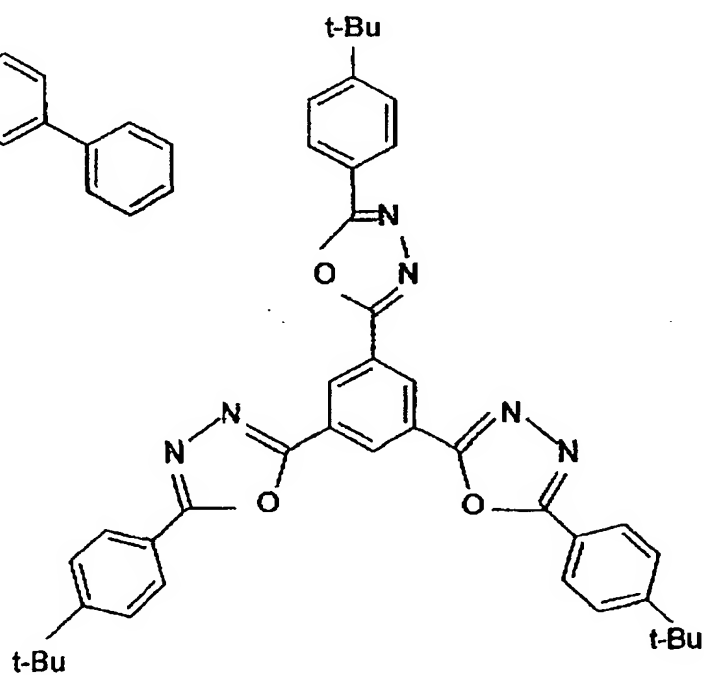
BND



OXD-7



TAZ



OXD-Star

Fig. 3

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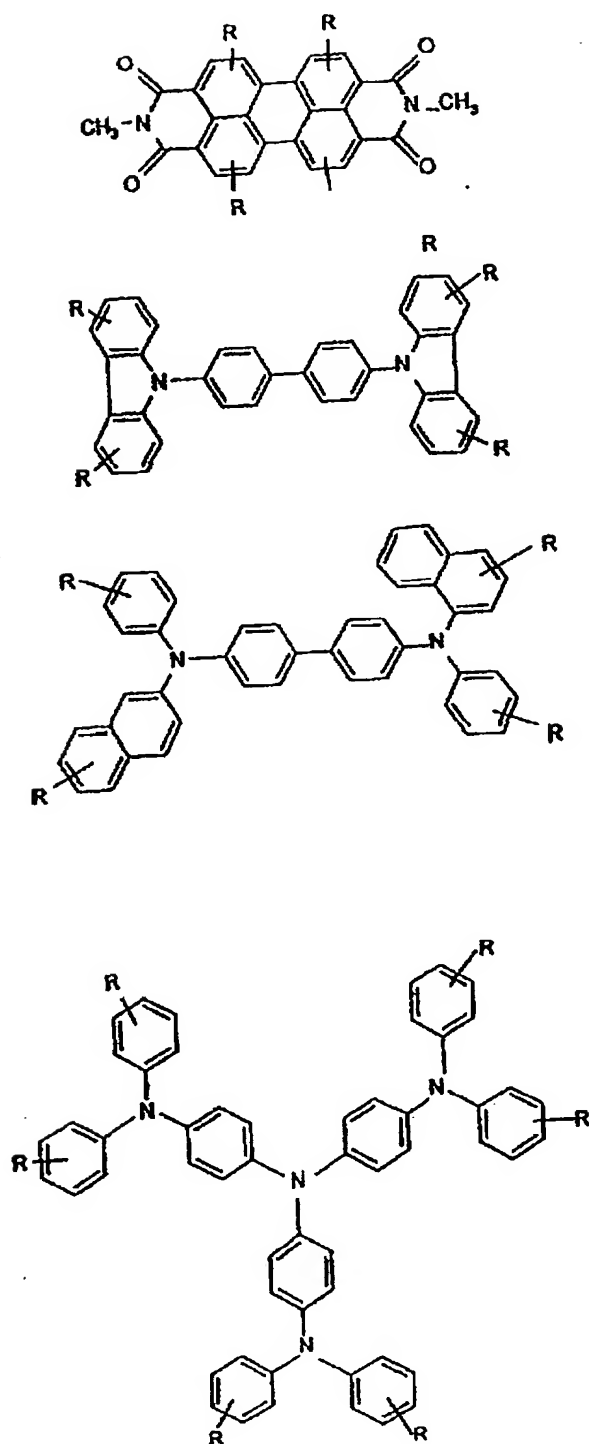


Fig. 4

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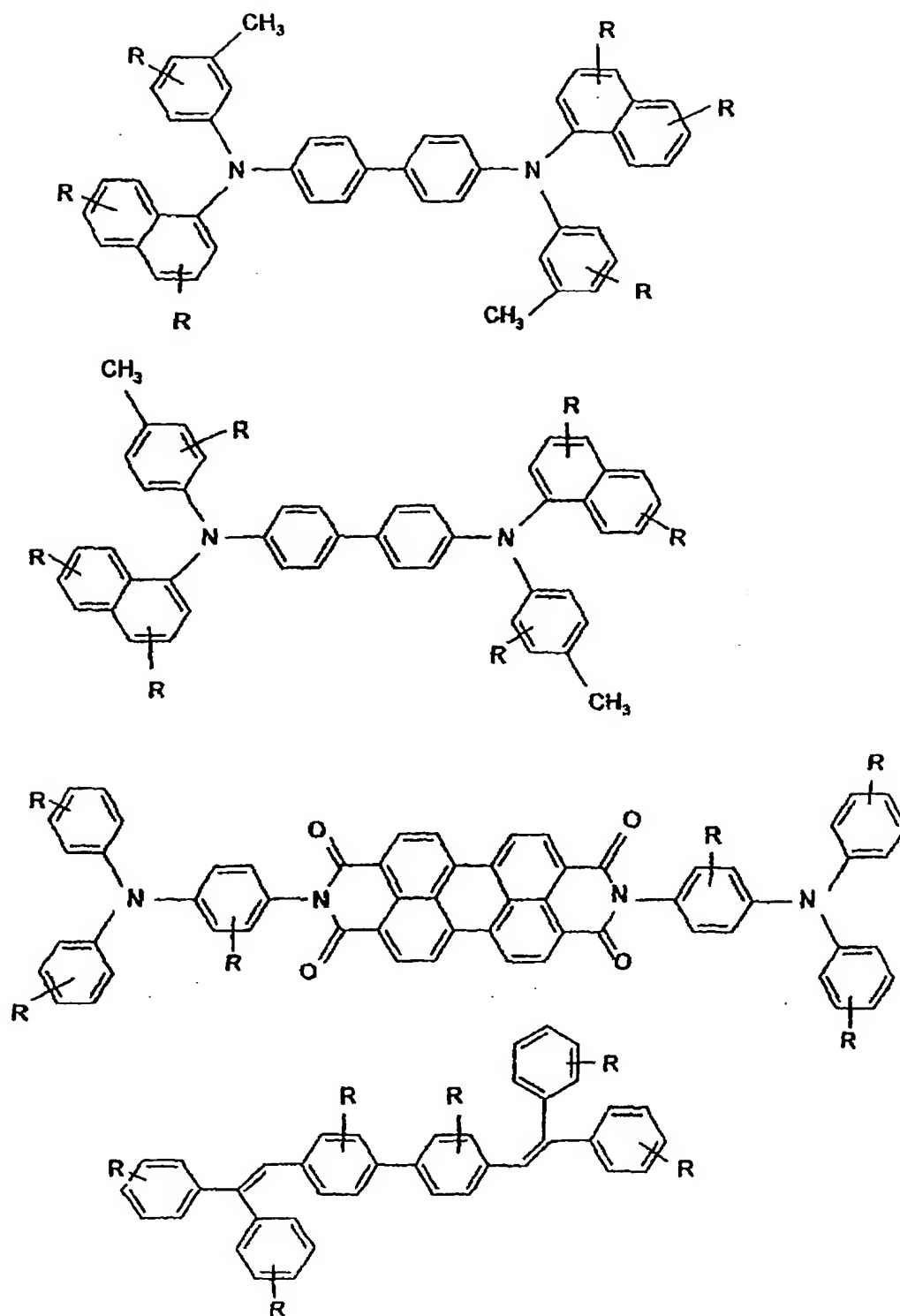


Fig. 5

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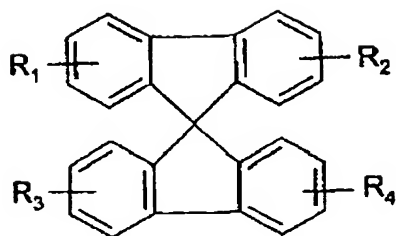


Fig. 14a

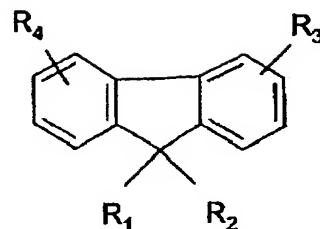
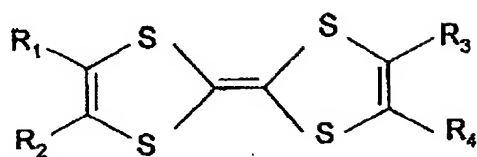


Fig. 14b



or

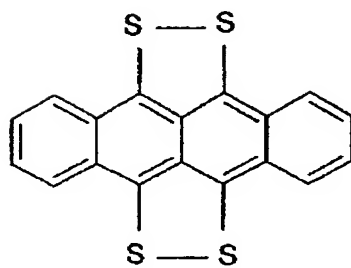
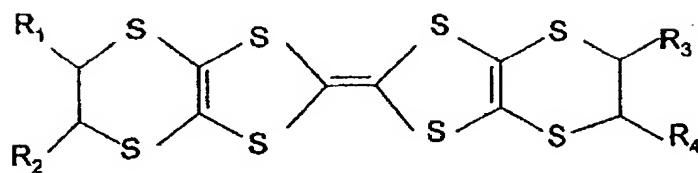


Fig. 6

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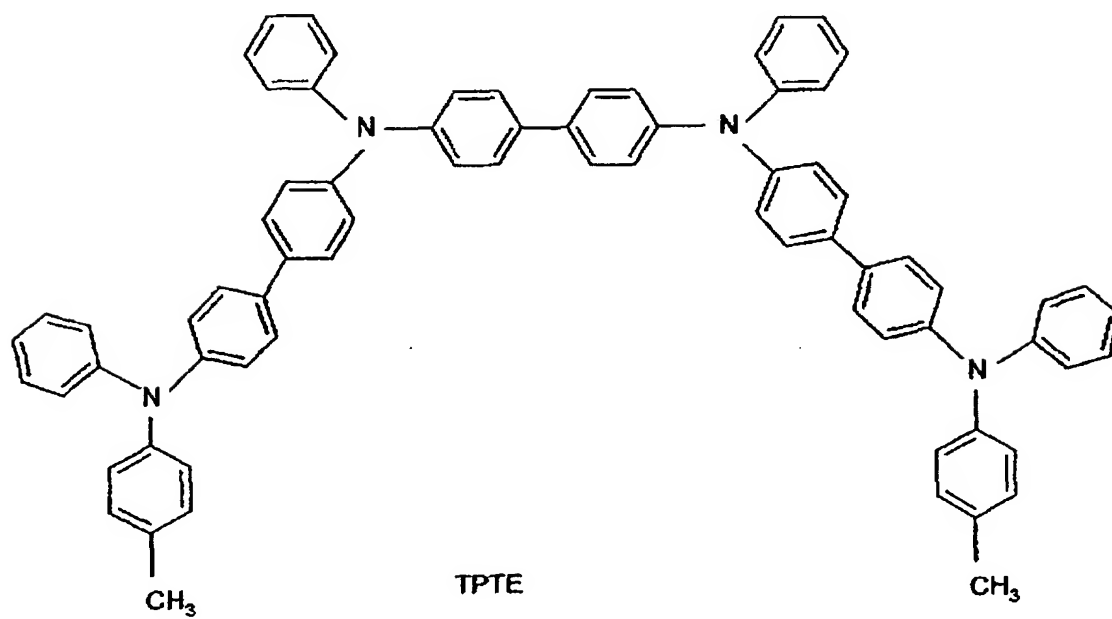
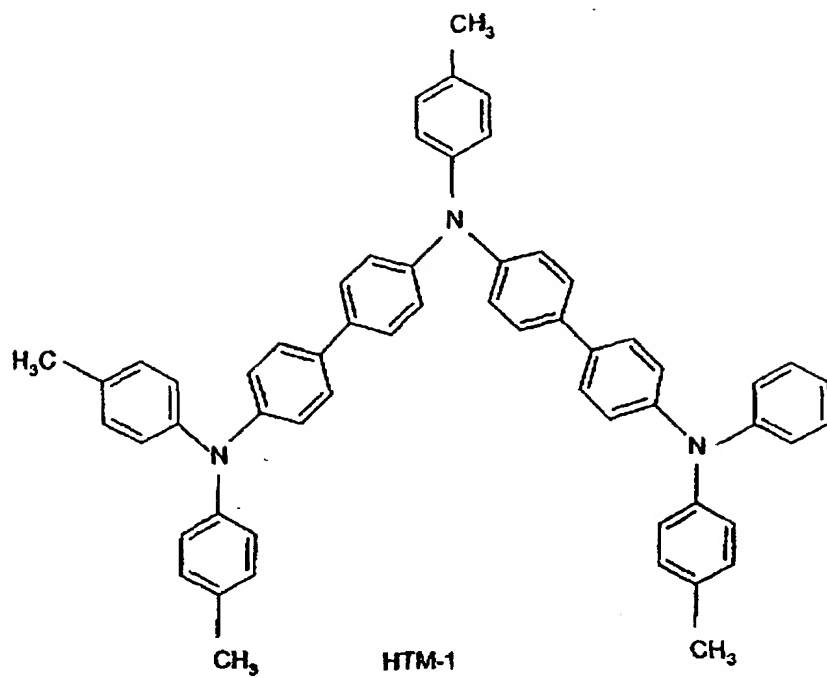
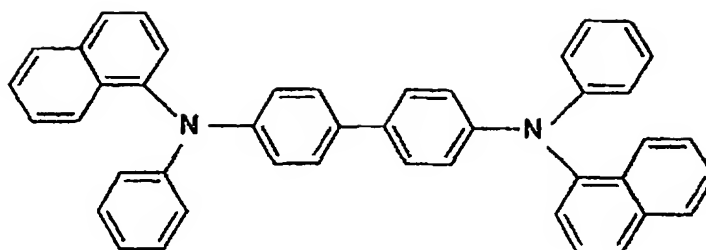
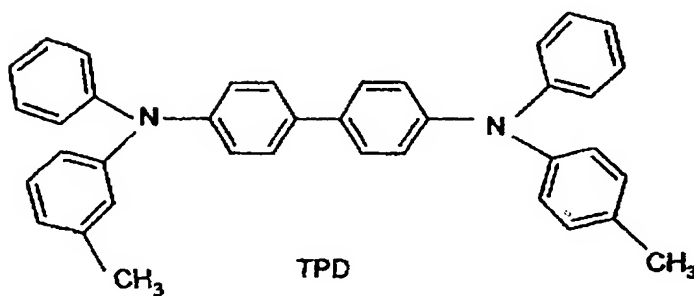
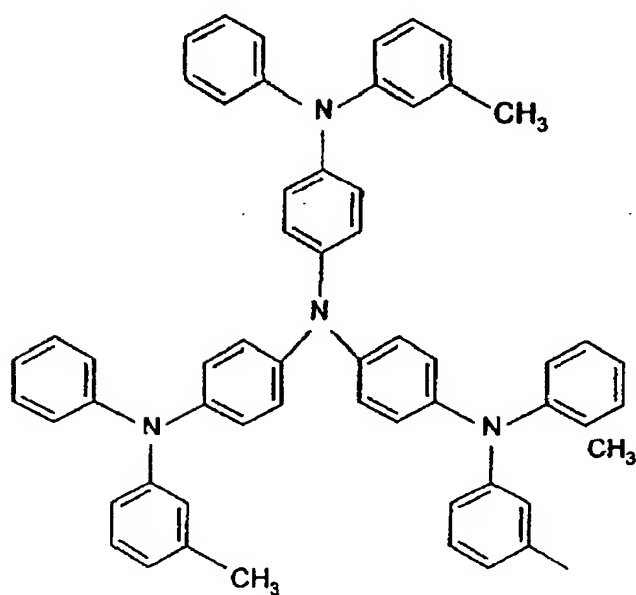


Fig. 7

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 $\alpha$ -NPB

TPD



mTADATA

Fig. 8



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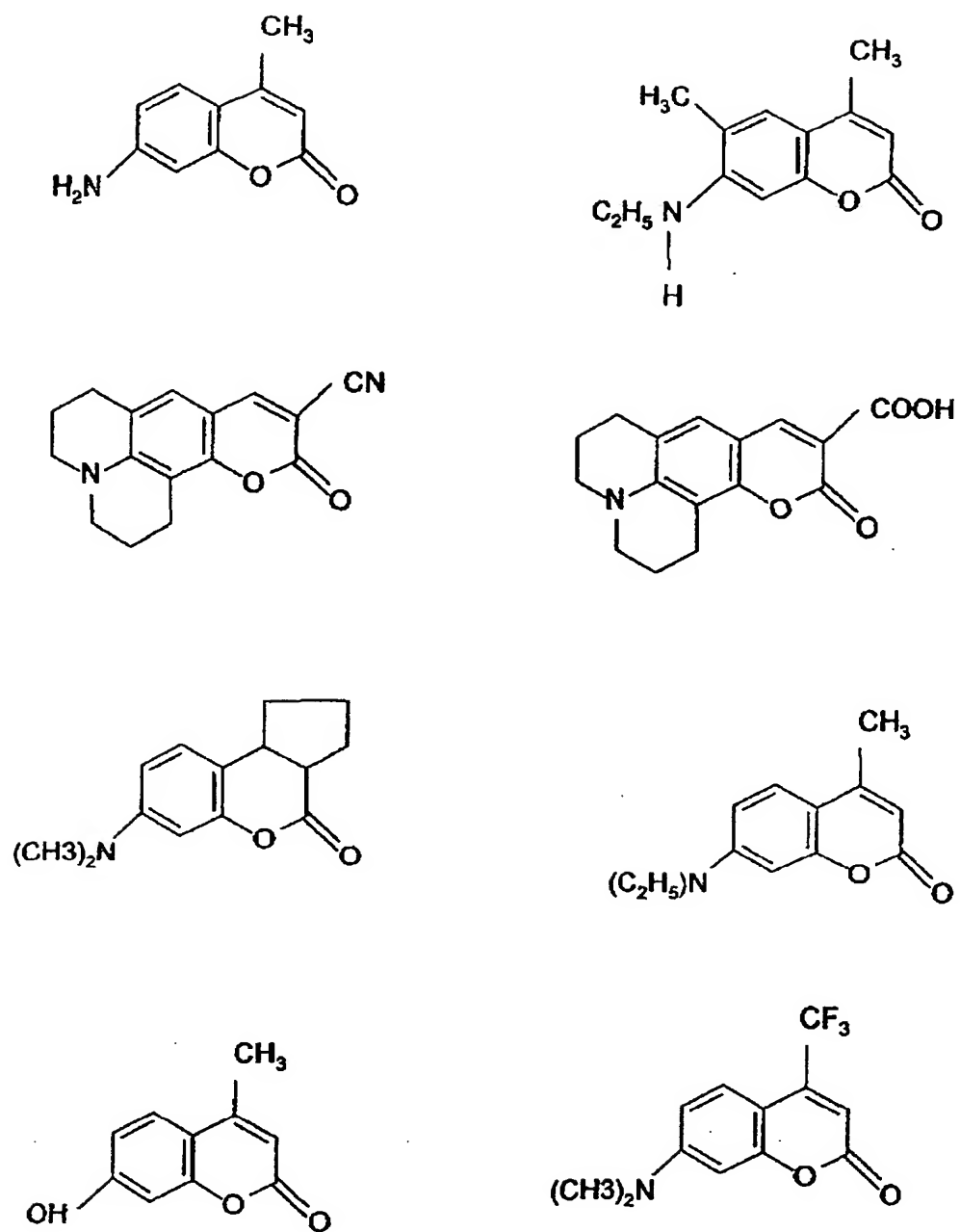


Fig. 9

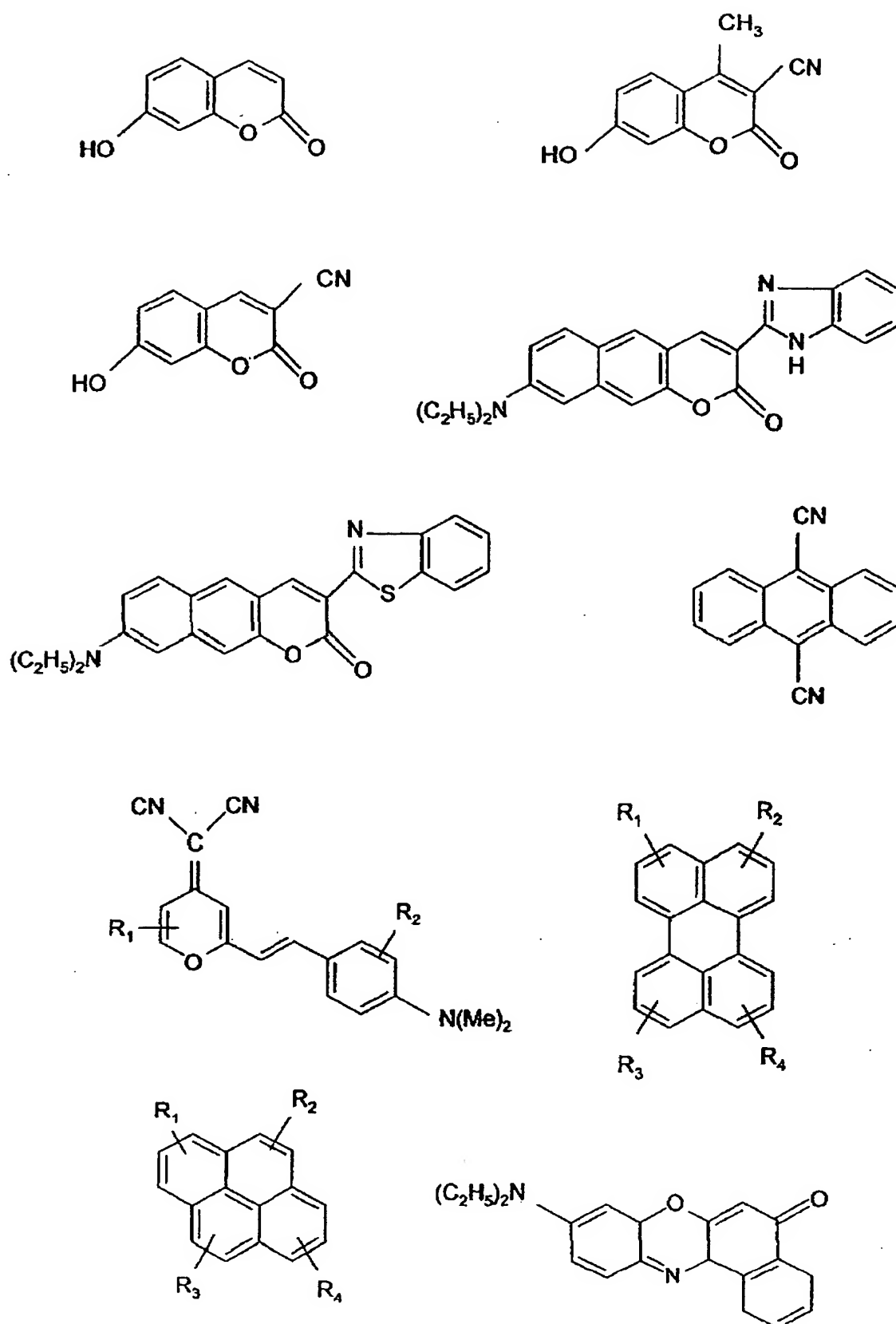


Fig. 10

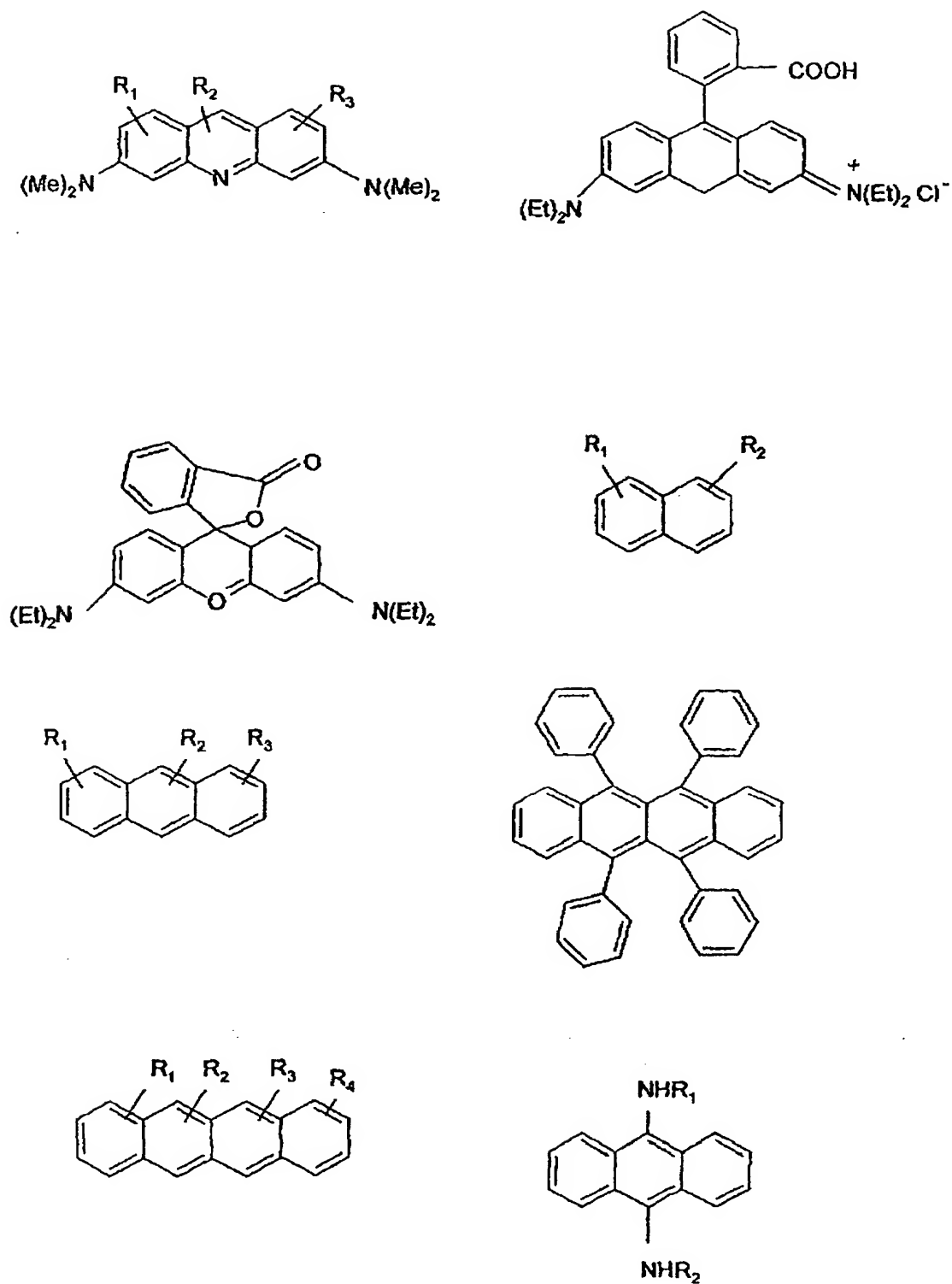


Fig. 11

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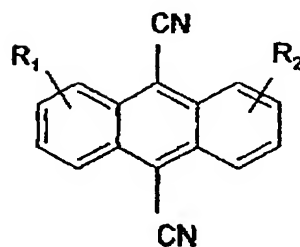
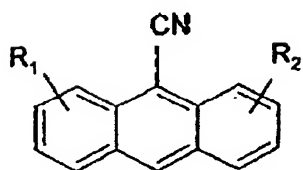
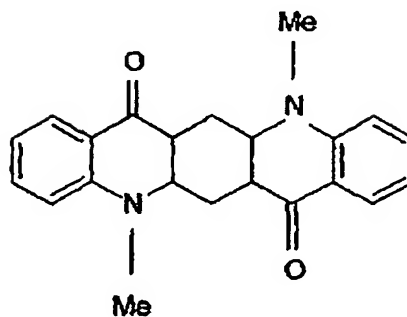
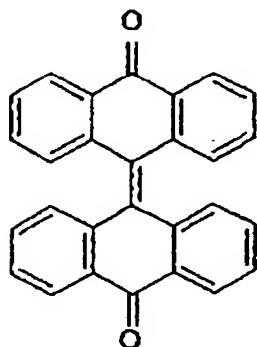
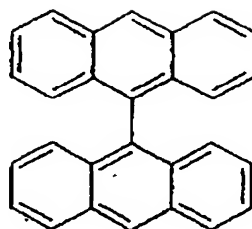
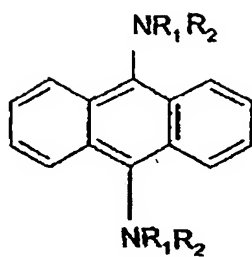


Fig. 12

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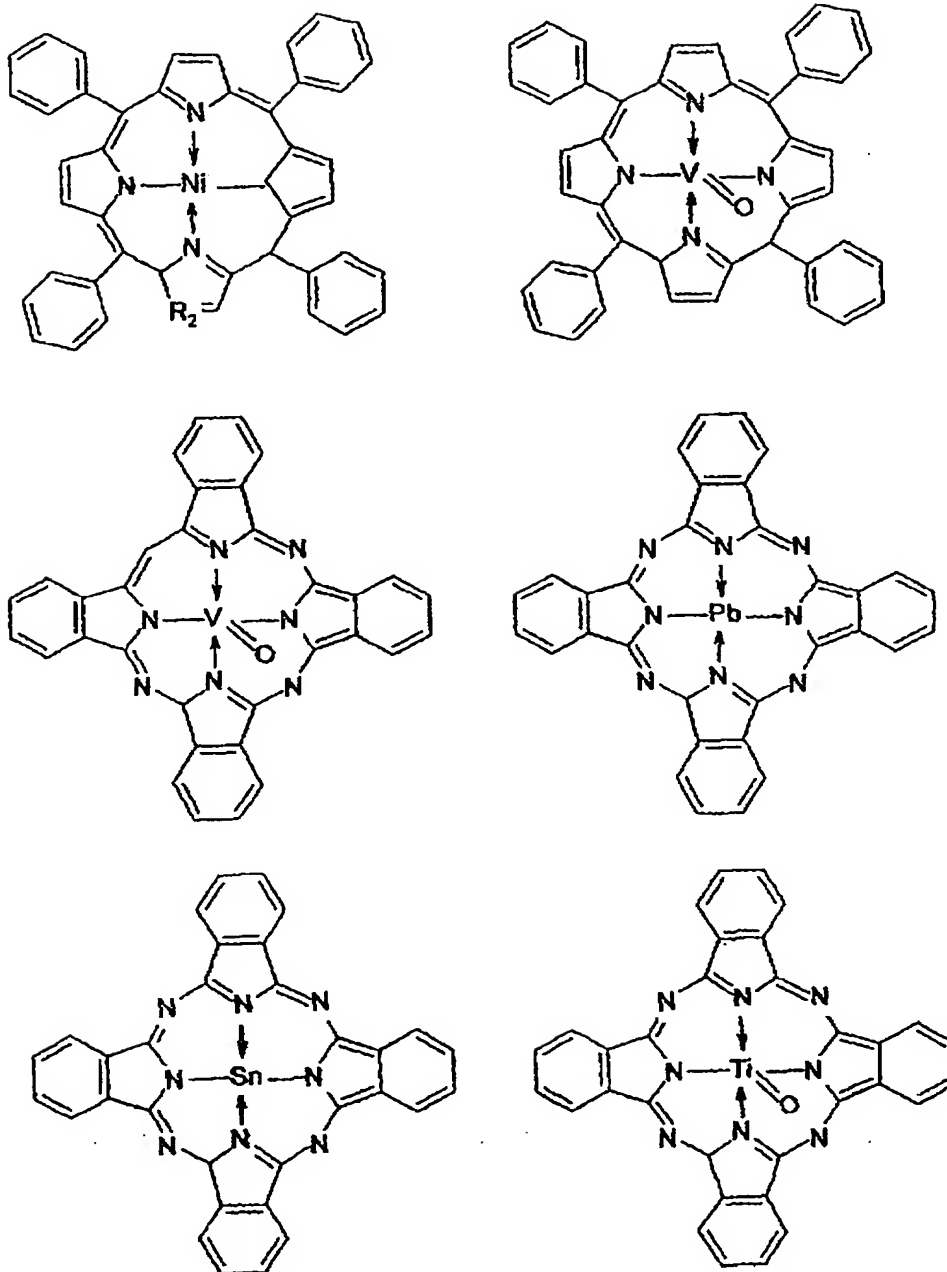


Fig. 13

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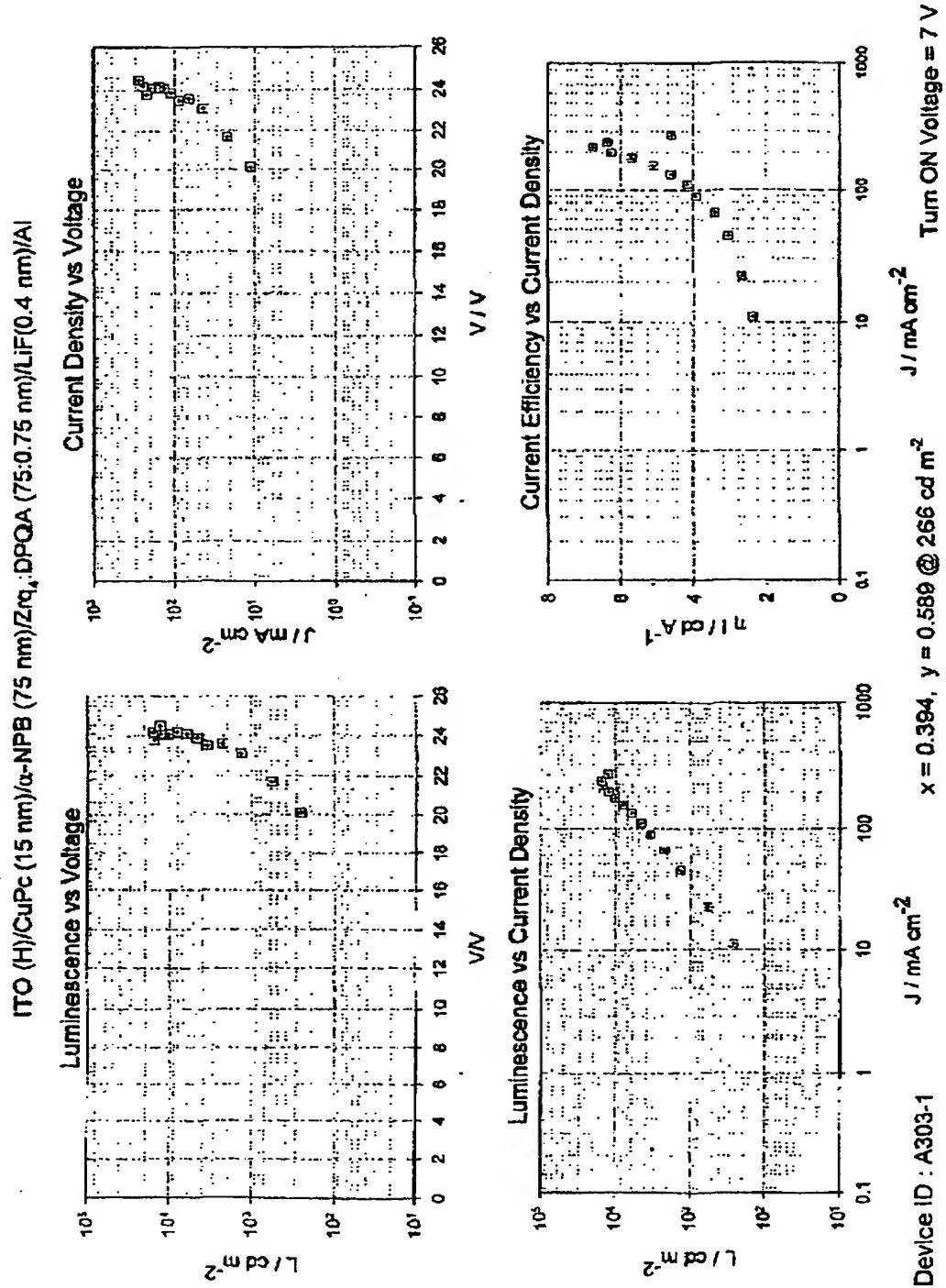


Fig. 14

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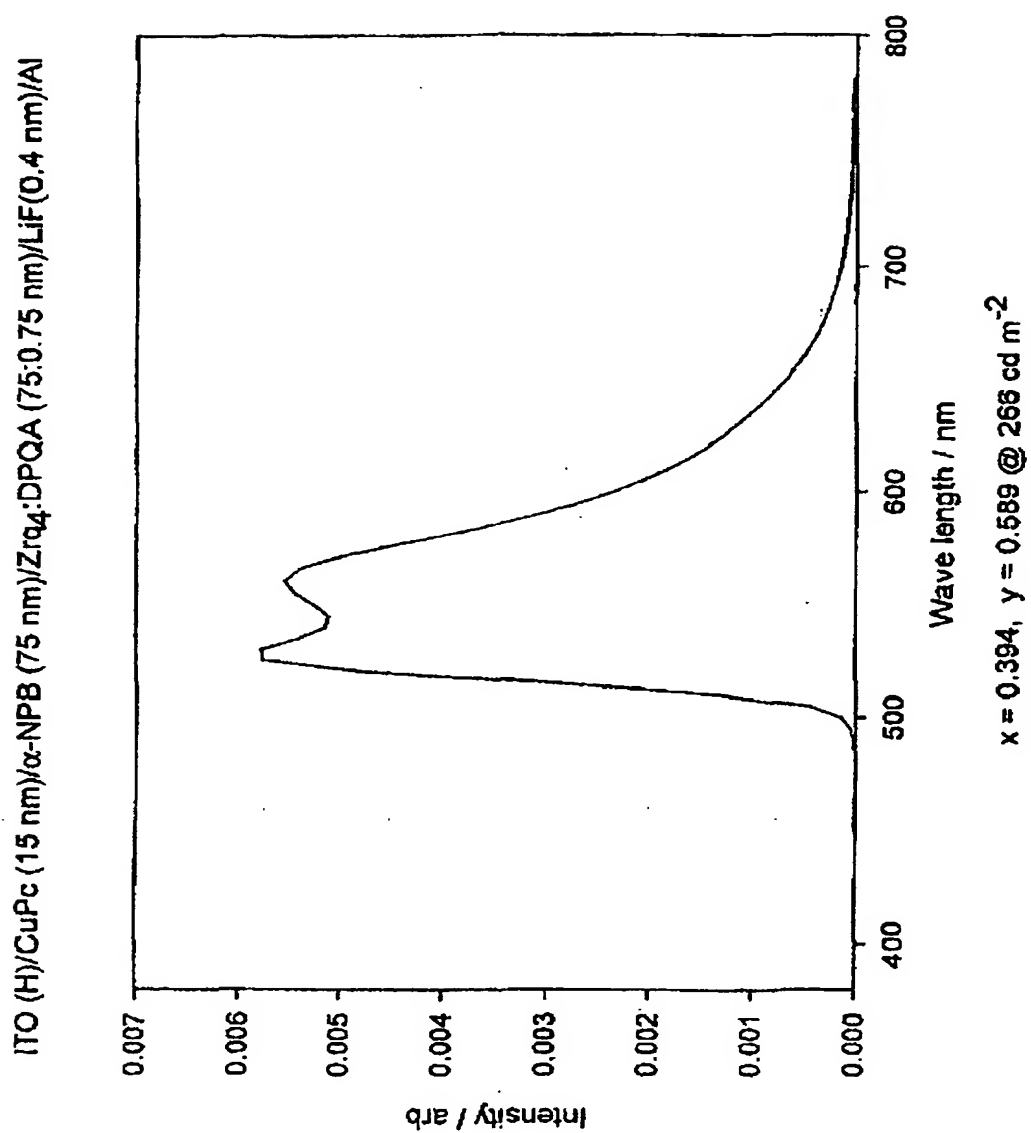
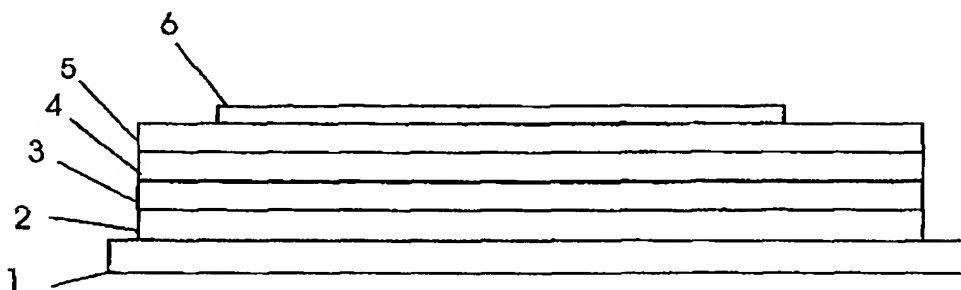


Fig. 15

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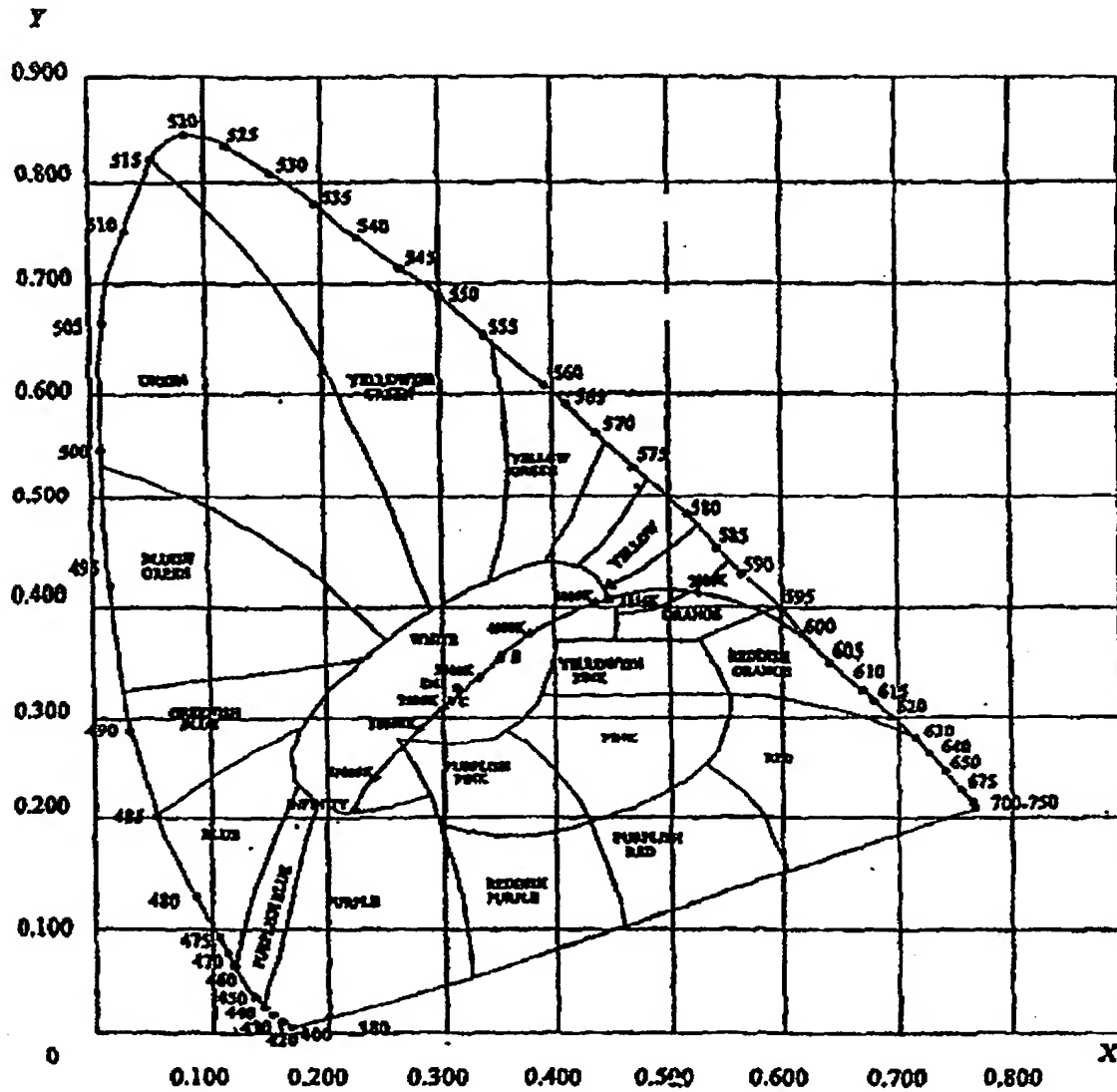


1 is ITO; 2 is CuPC; 3 is  $\alpha$ -NPB; 4 is Zr<sub>q</sub>:DPQA; 5 is LiF and 6 is Al.

Fig. 16



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CIE 1931 x,y chromaticity diagram showing approximate position of perceived colours

Fig. 17

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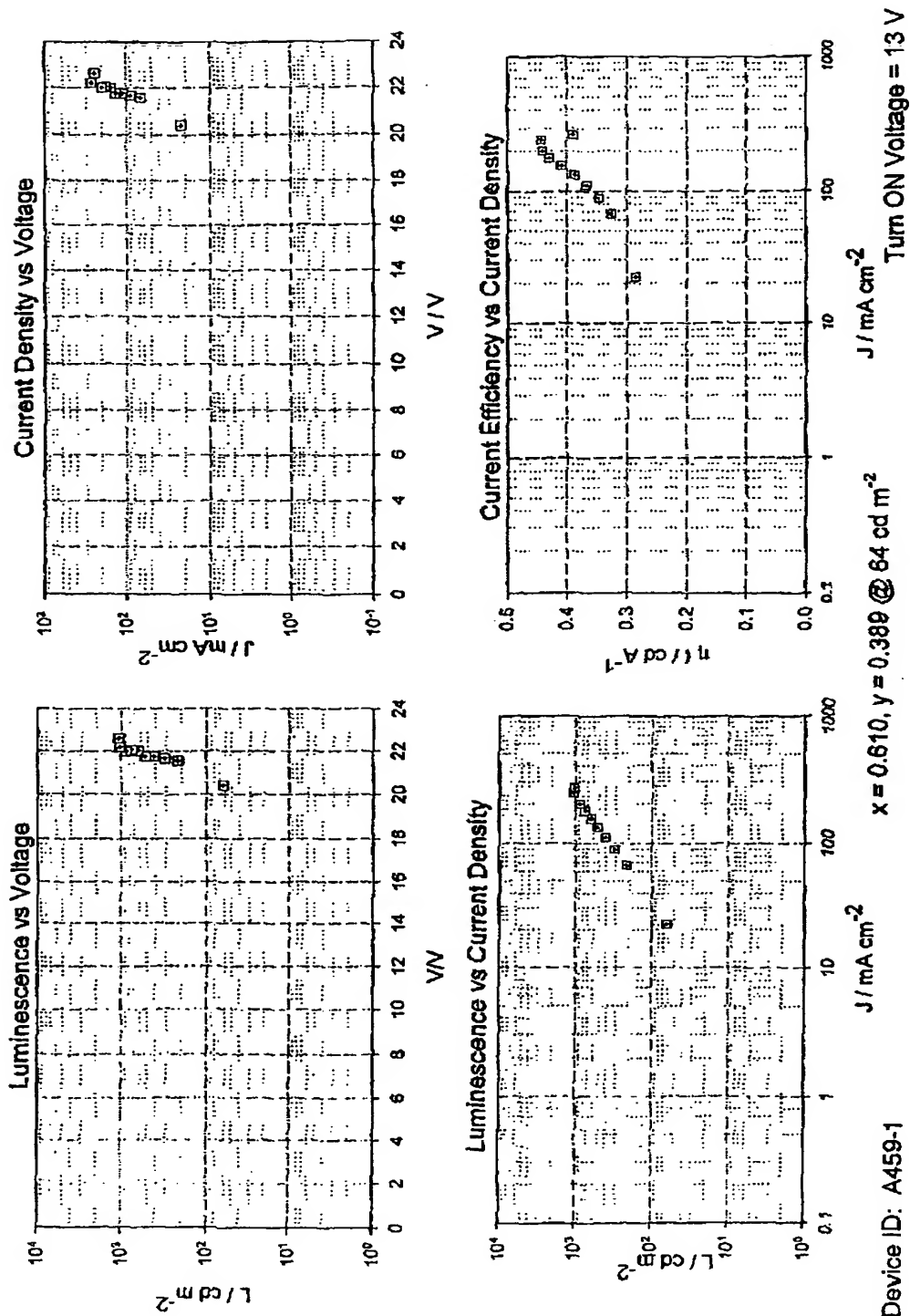
ITO (H)/CuPc (25 nm)/ $\alpha$ -NPc (75 nm)/Zrq<sub>2</sub>:Nl:Red (75:0.38 nm)/LiF (0.4 nm)/Al

Fig. 18

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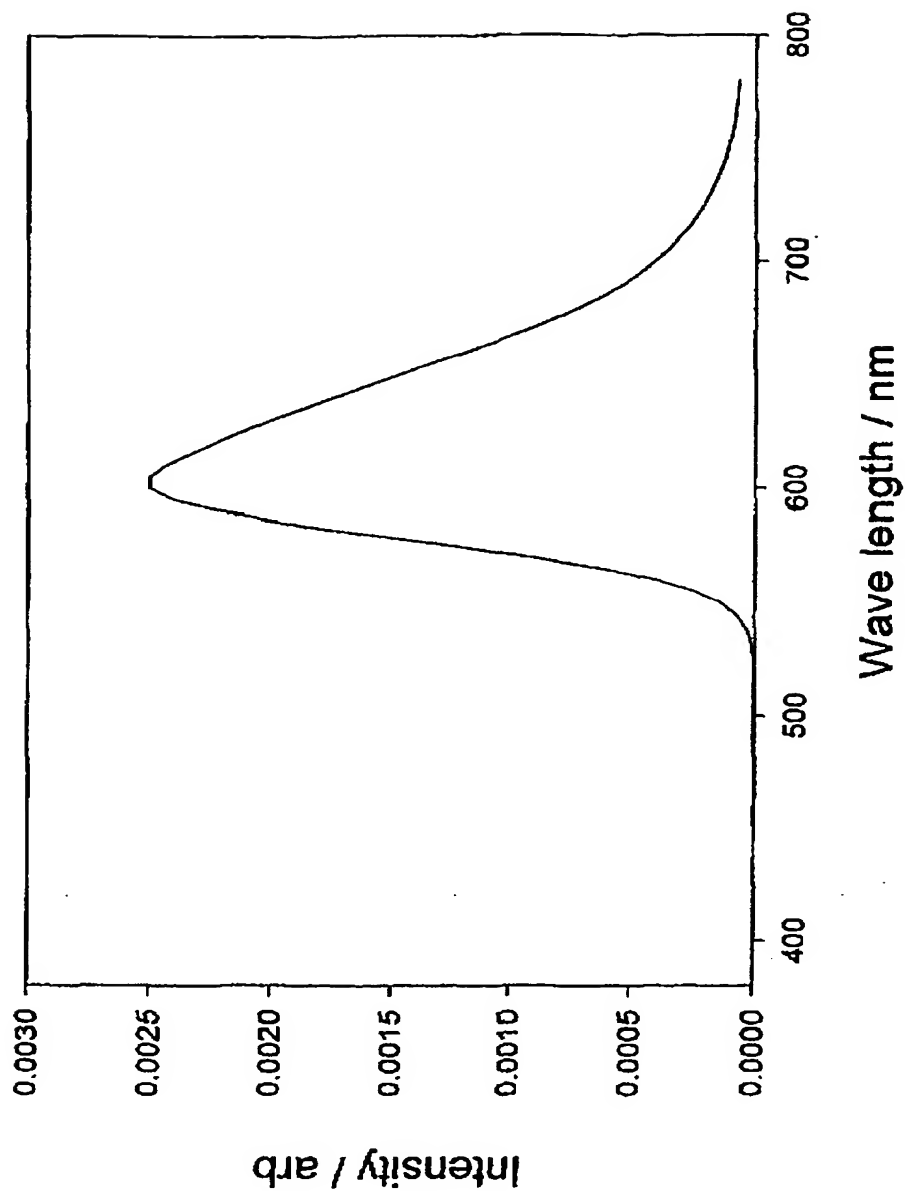
ITO (H)/ CuPc (25 nm)/ $\alpha$ -NPB (75 nm)/ZrO<sub>2</sub>:Nillered (75:0.38 nm)/LiF (0.4 nm)/Al $x = 0.610, y = 0.389 @ 64 \text{ cd m}^{-2}$ 

Fig. 19

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ITO (H)/CuPc (25 nm)/ $\alpha$ -NPB (75 nm)/Zr<sub>q</sub>:DPOA(60:0.4 nm)/Zr<sub>q</sub> (10 nm)/LIF (0.4 nm)/Al

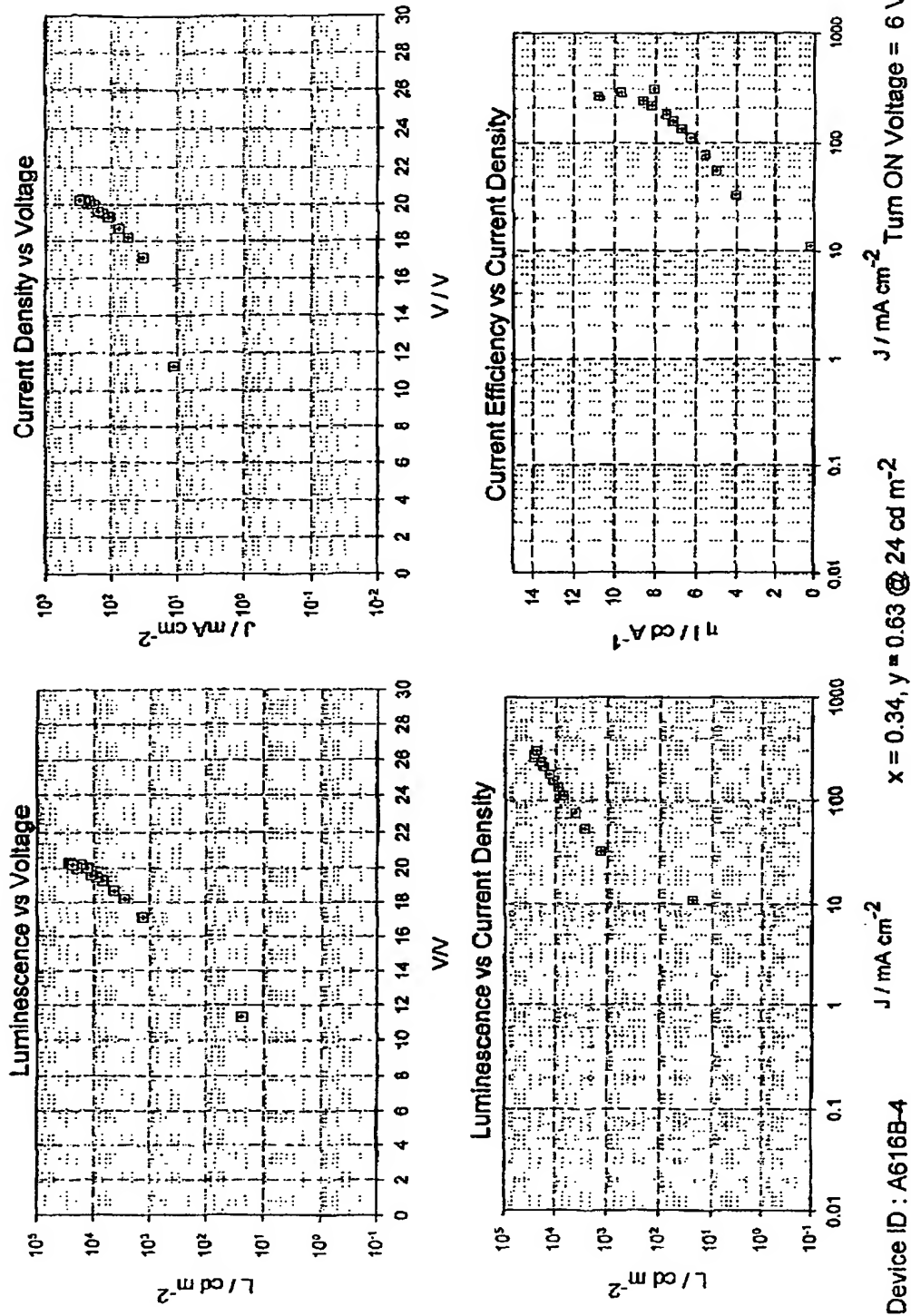


Fig. 20

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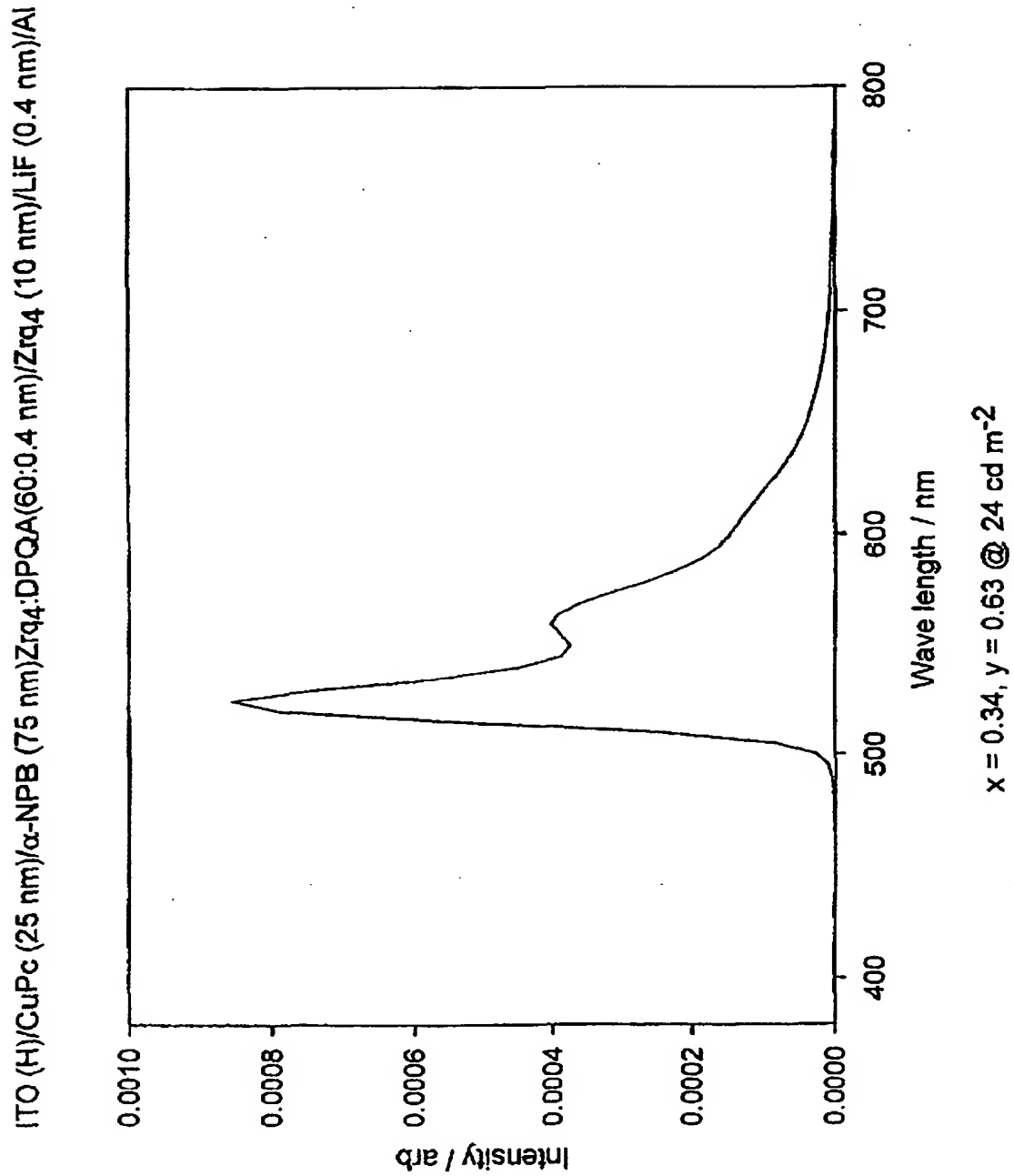


Fig. 21

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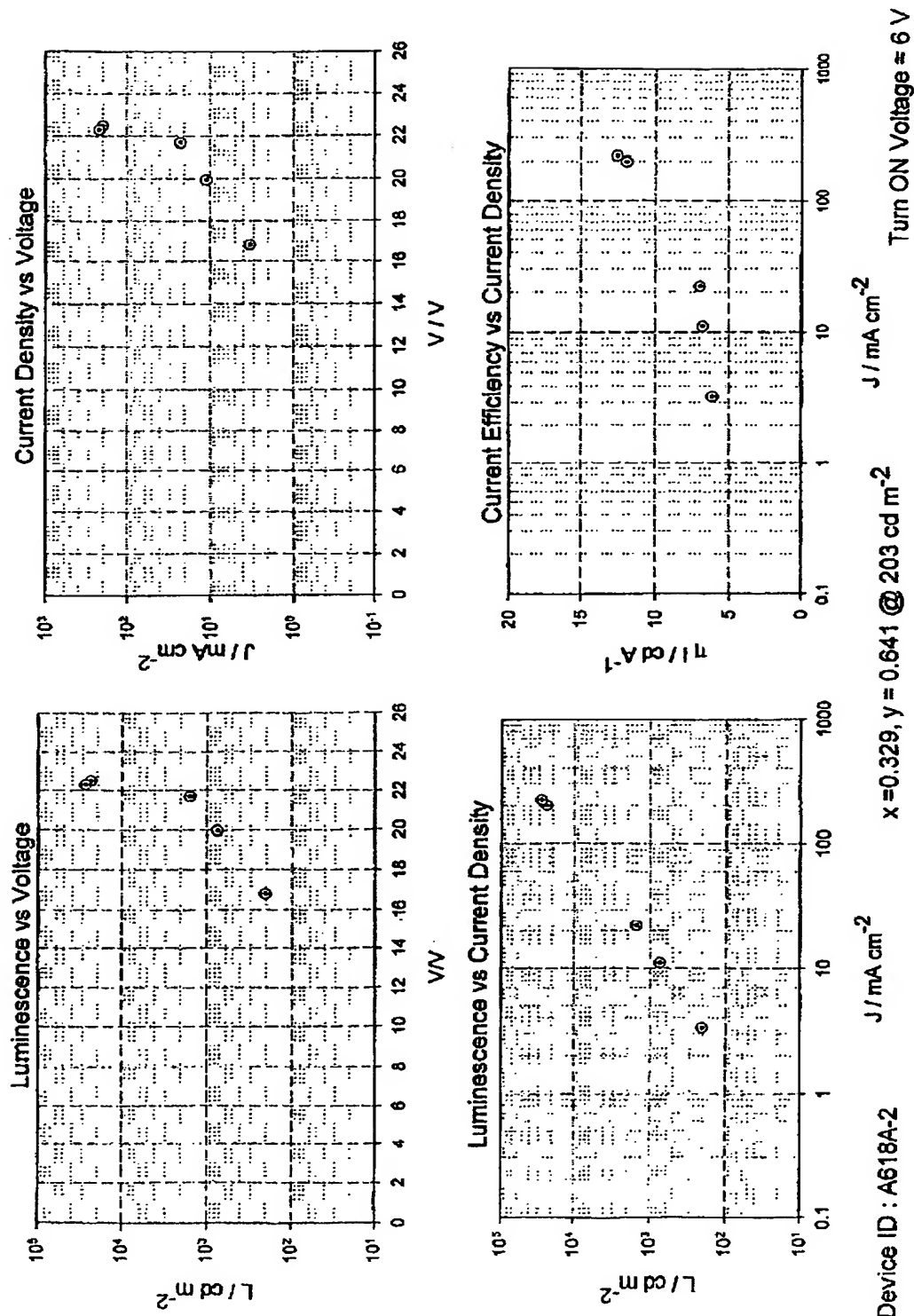
ITO (H)/CuPc:TPTP (15:15 nm)/ $\alpha$ -NPB (75 nm)/Zr<sub>q</sub>:DPOA (60:0.5 nm)/LIF (0.2 nm)/Al

Fig. 22

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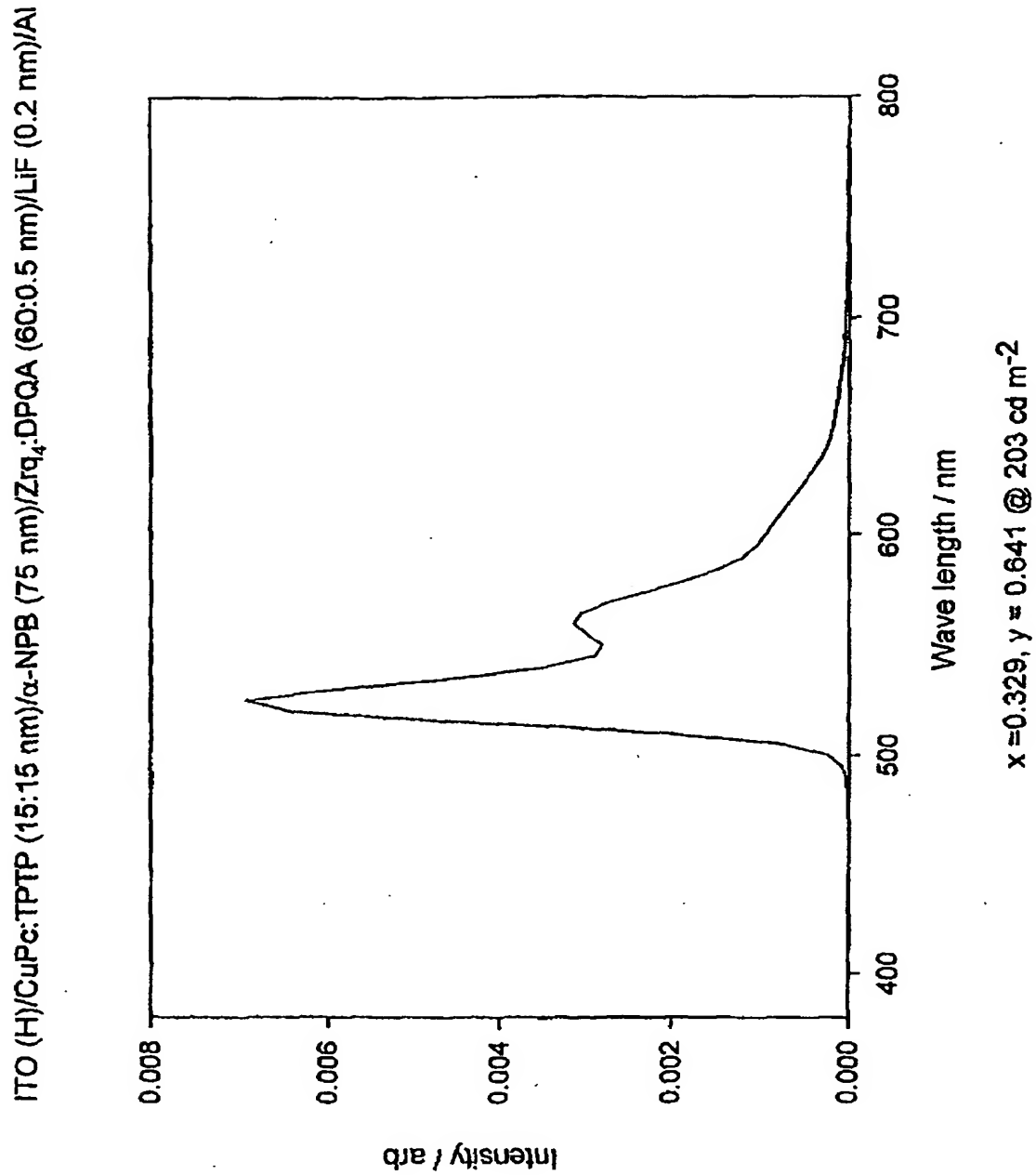


Fig. 23

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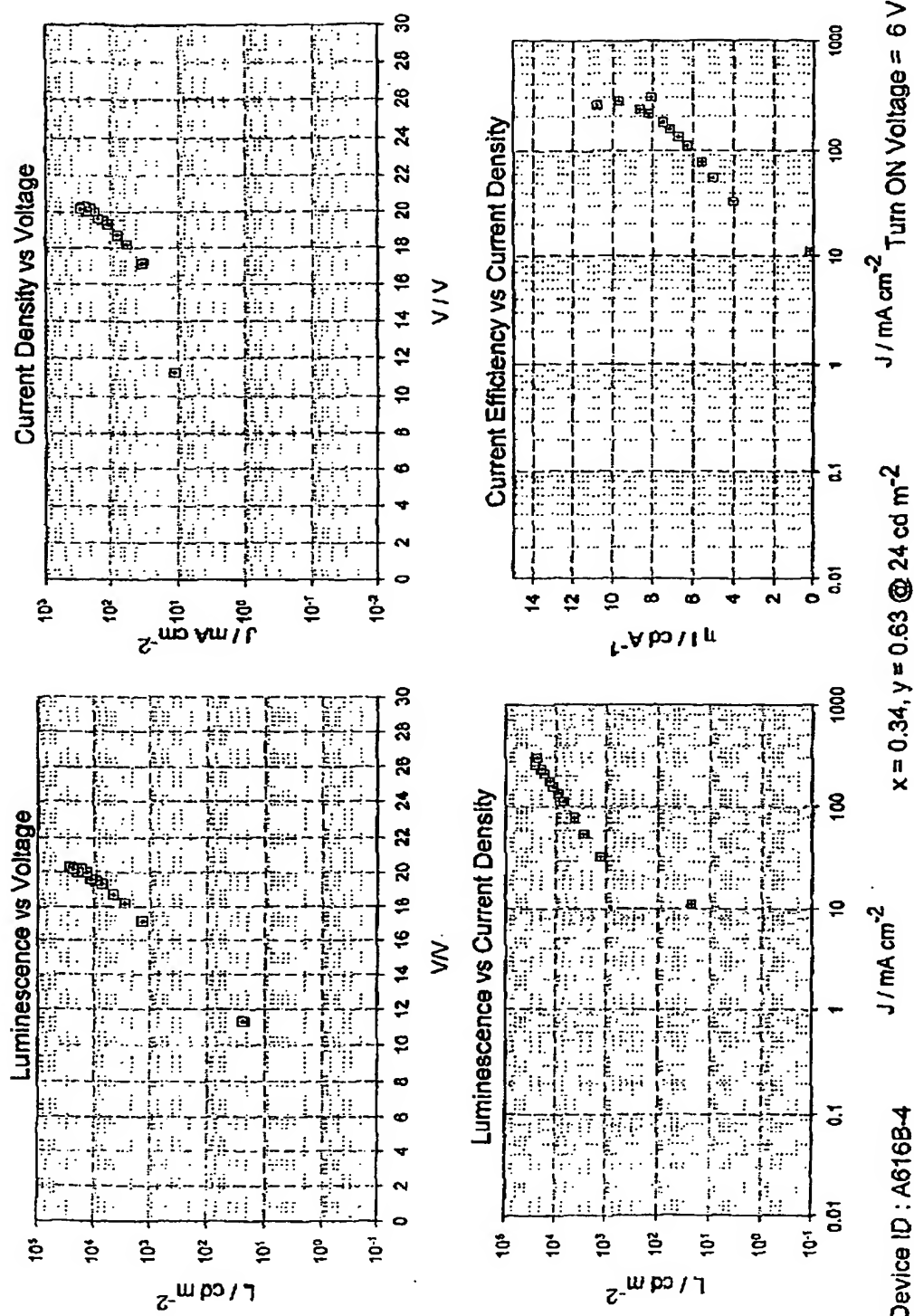
ITO (H)/CuPc (25 nm)/ $\alpha$ -NPB (75 nm)/Zr<sub>4</sub>:DPQA(60:0.4 nm)/Zr<sub>4</sub> (10 nm)/LIF (0.4 nm)/Al

Fig. 24



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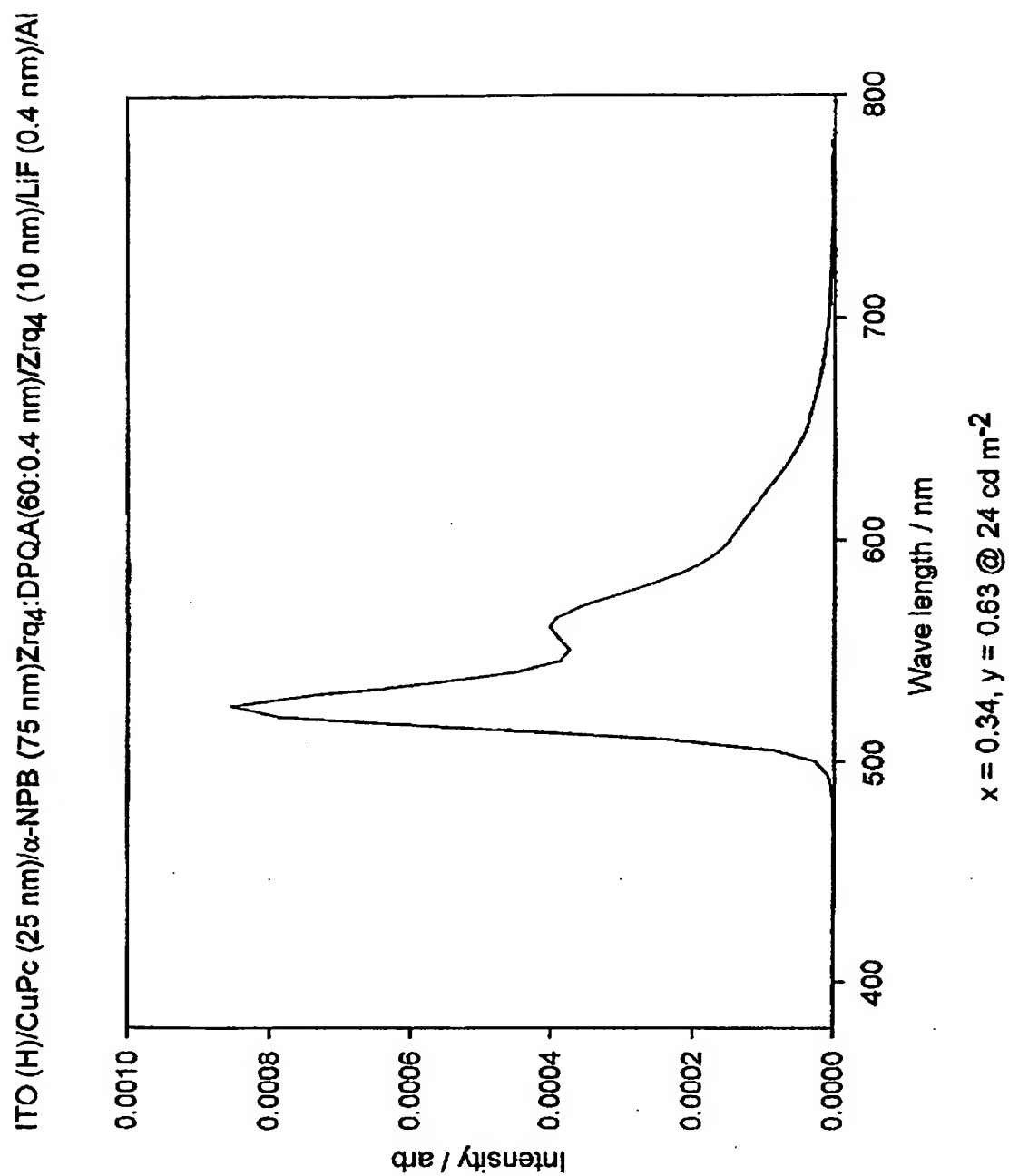


Fig. 25

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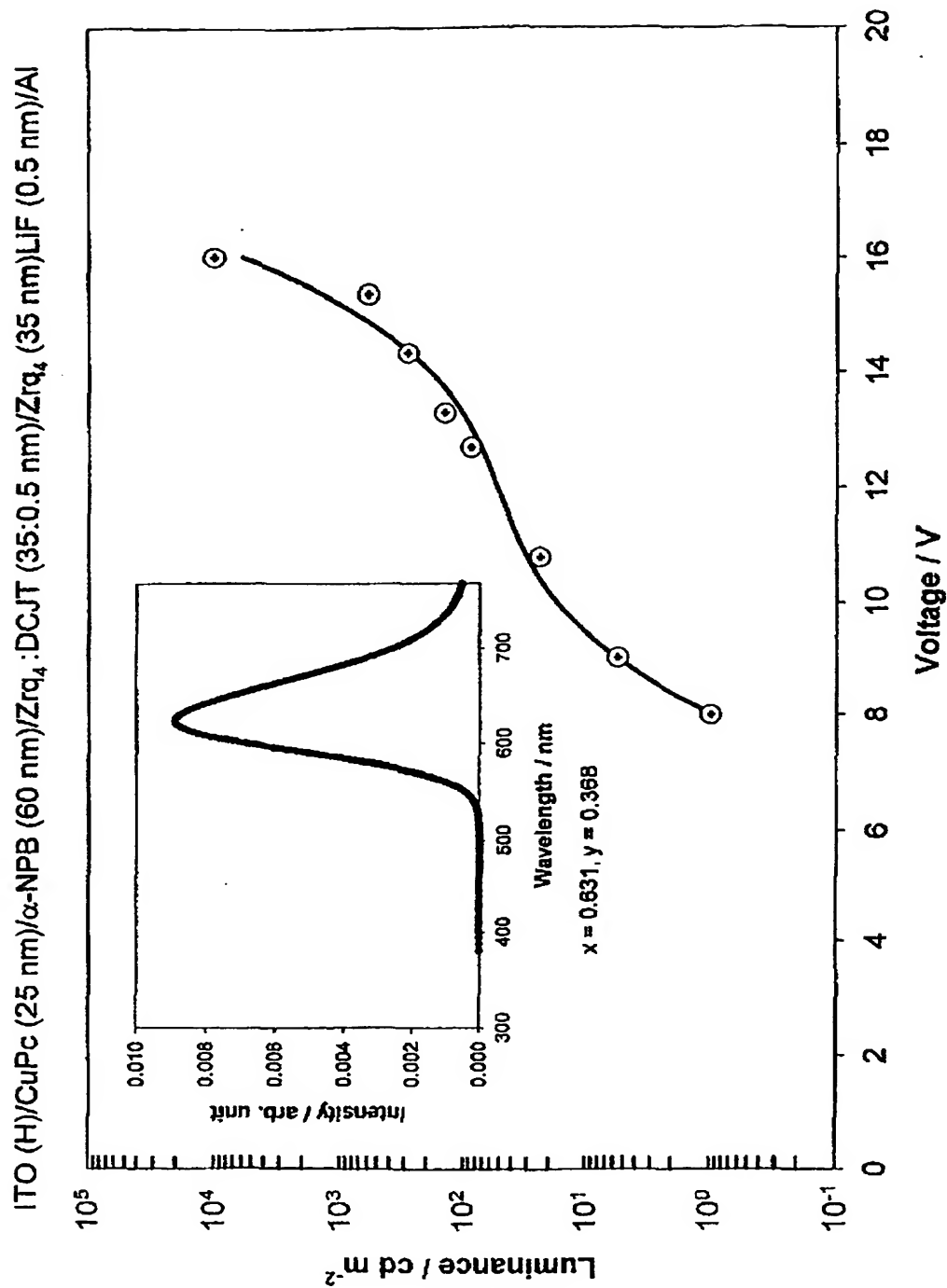


Fig. 26

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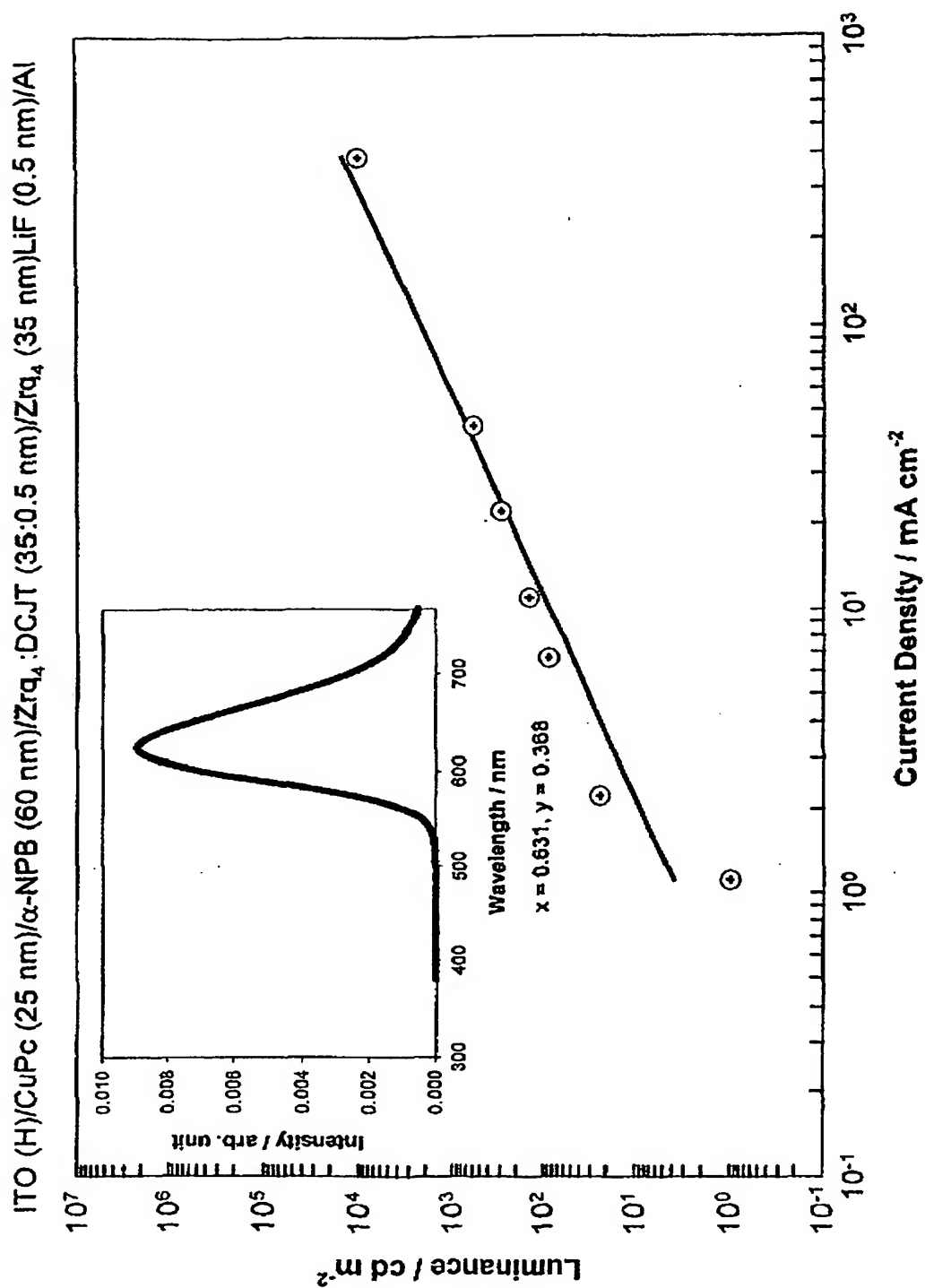


Fig. 27

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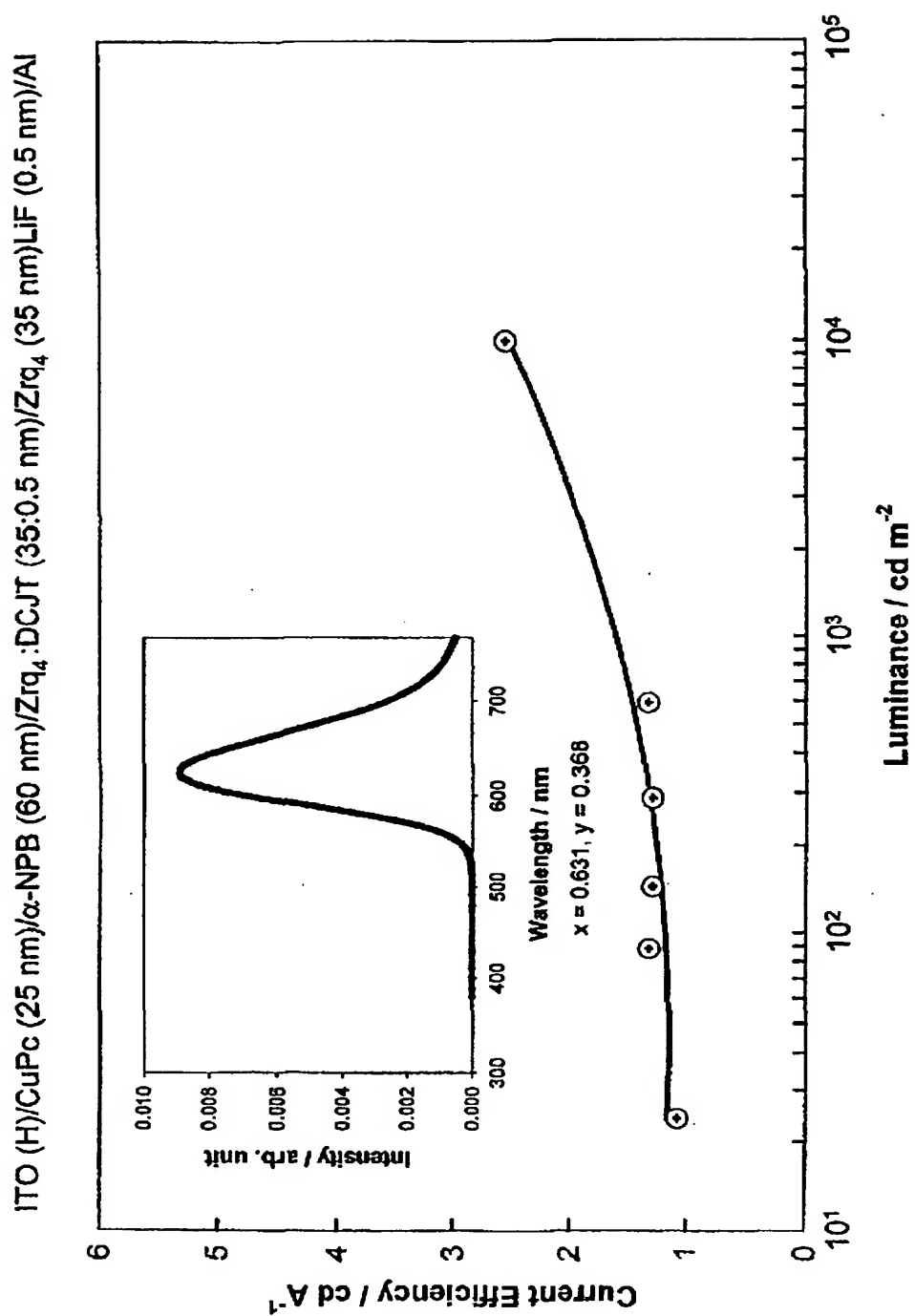


Fig. 28

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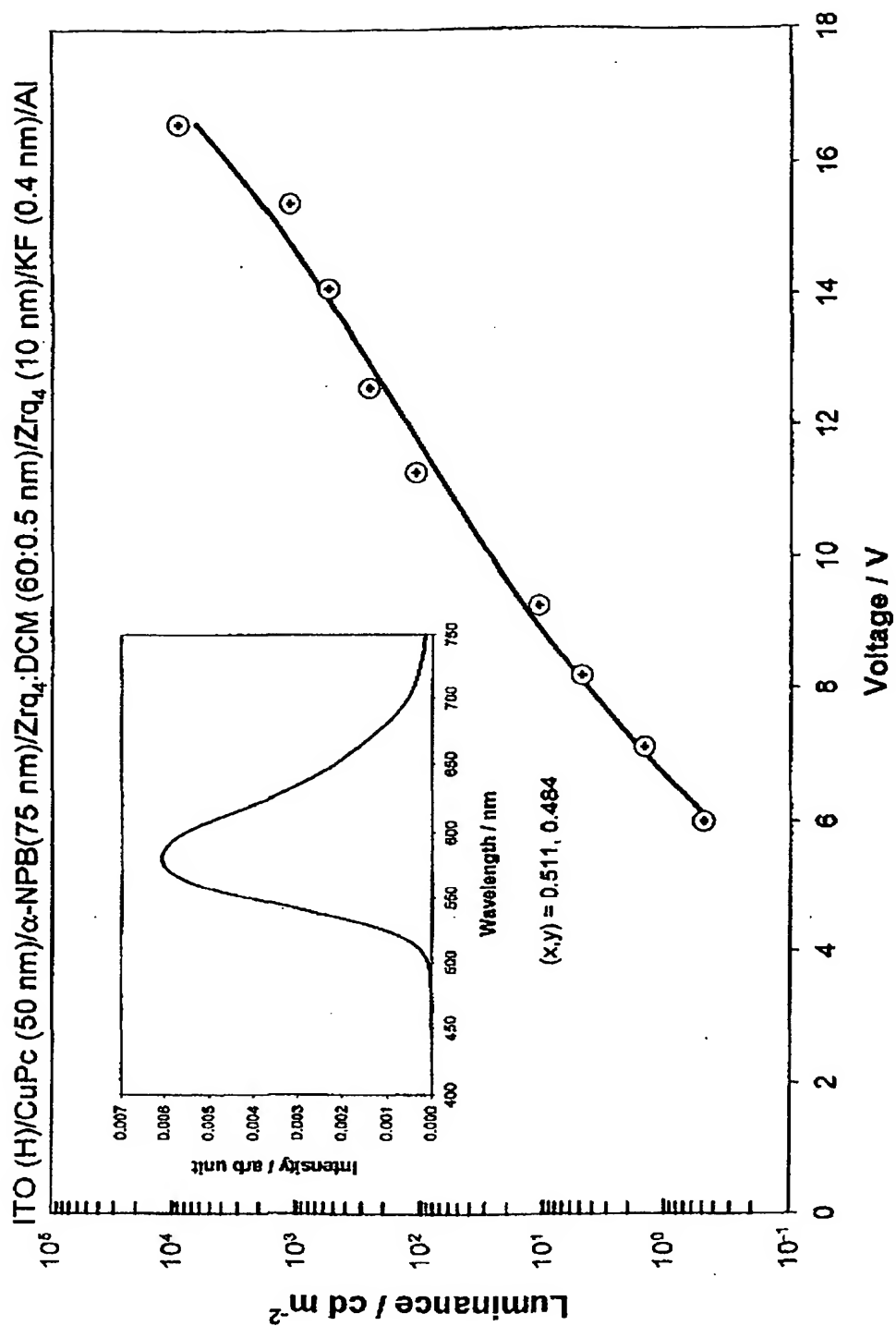


Fig. 29

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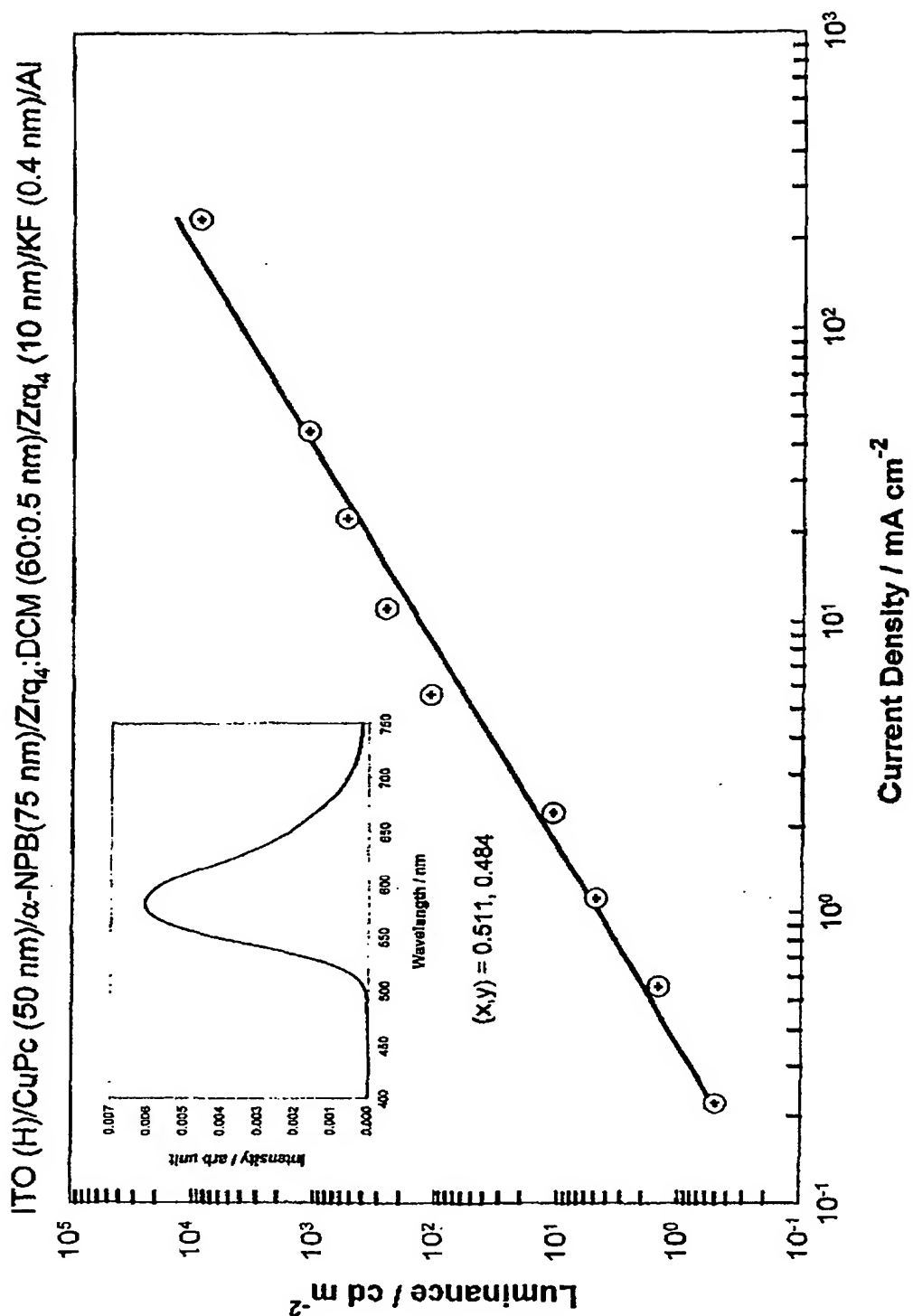


Fig. 30

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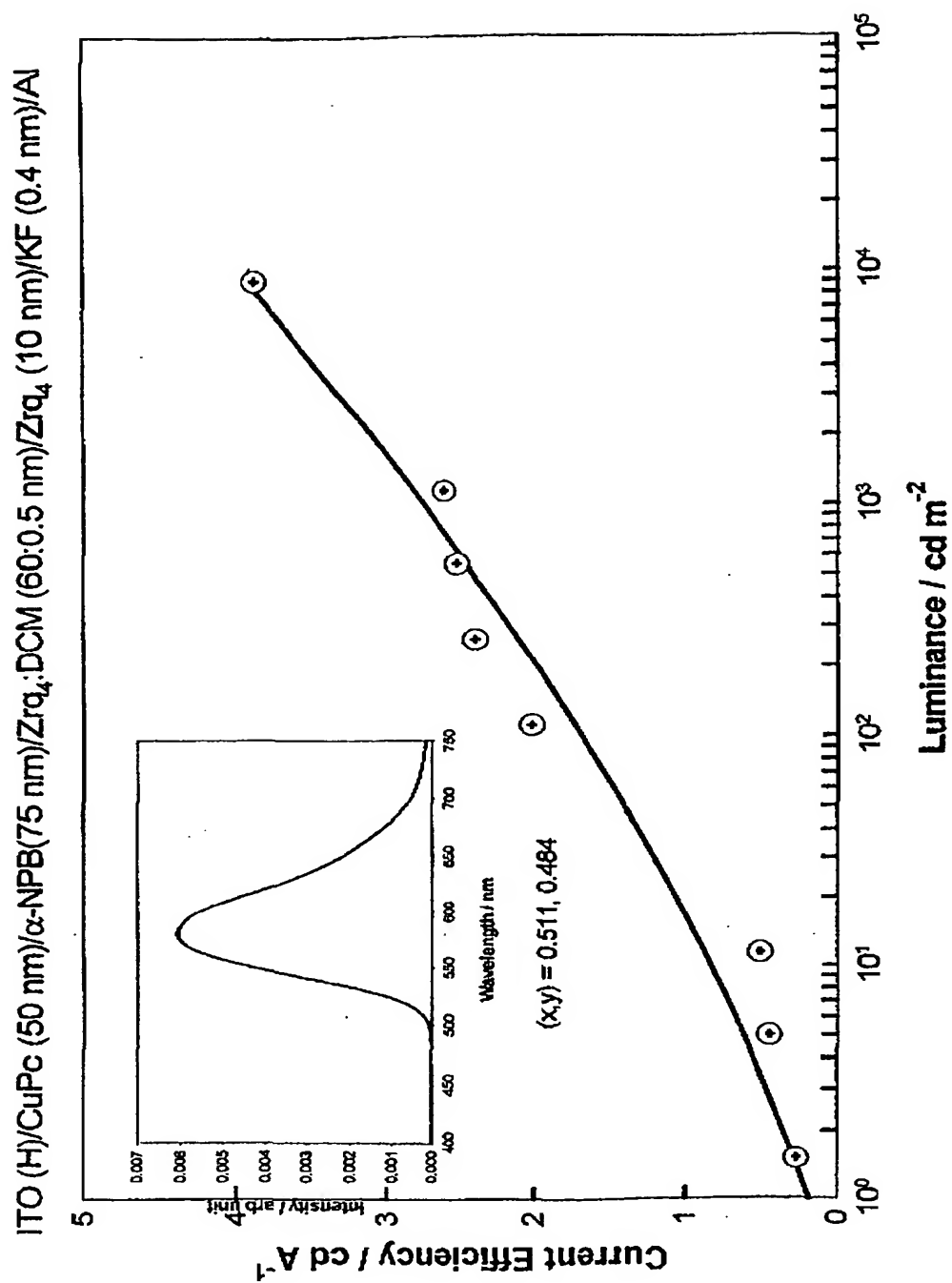


Fig. 31

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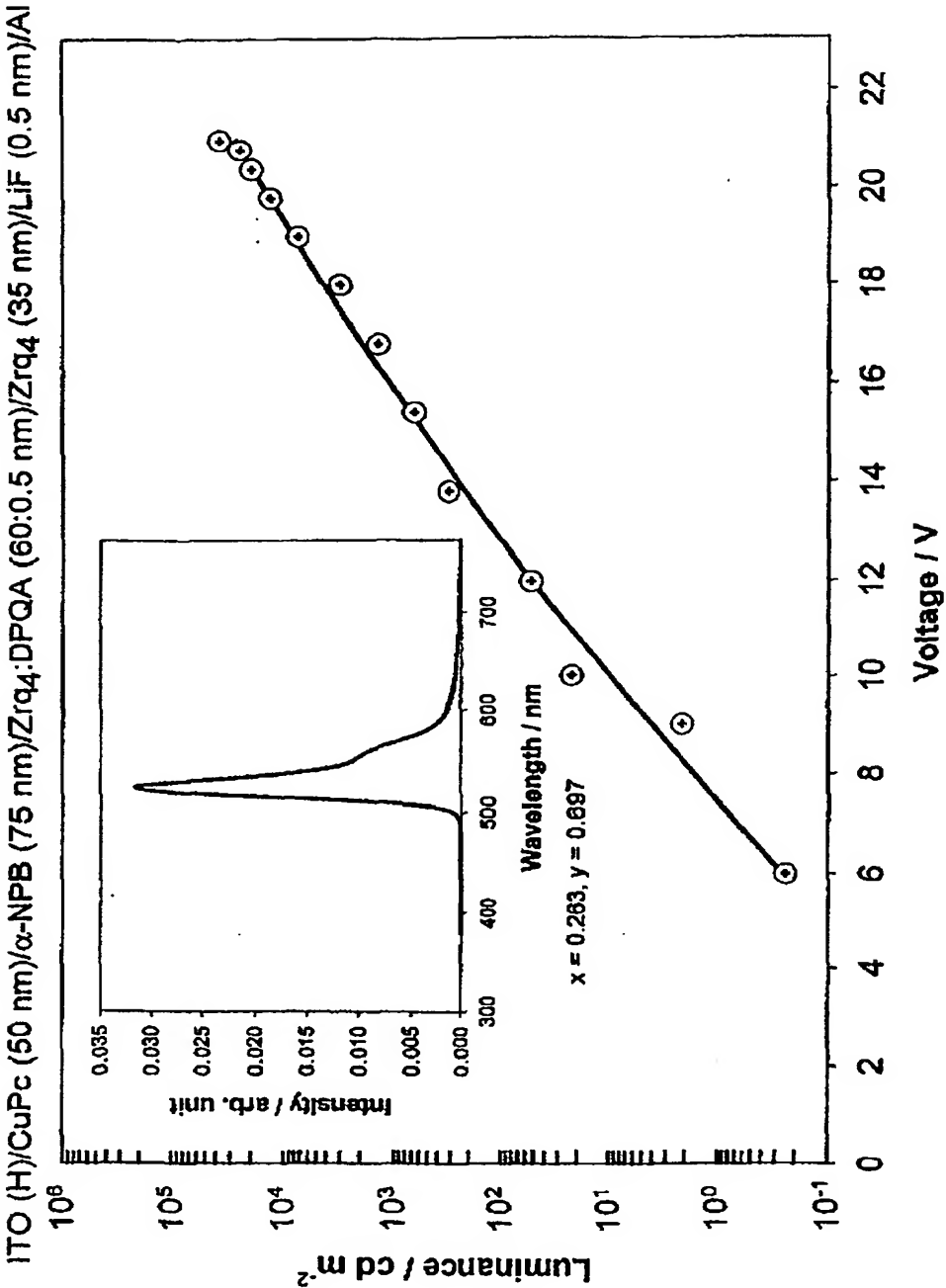


Fig. 32



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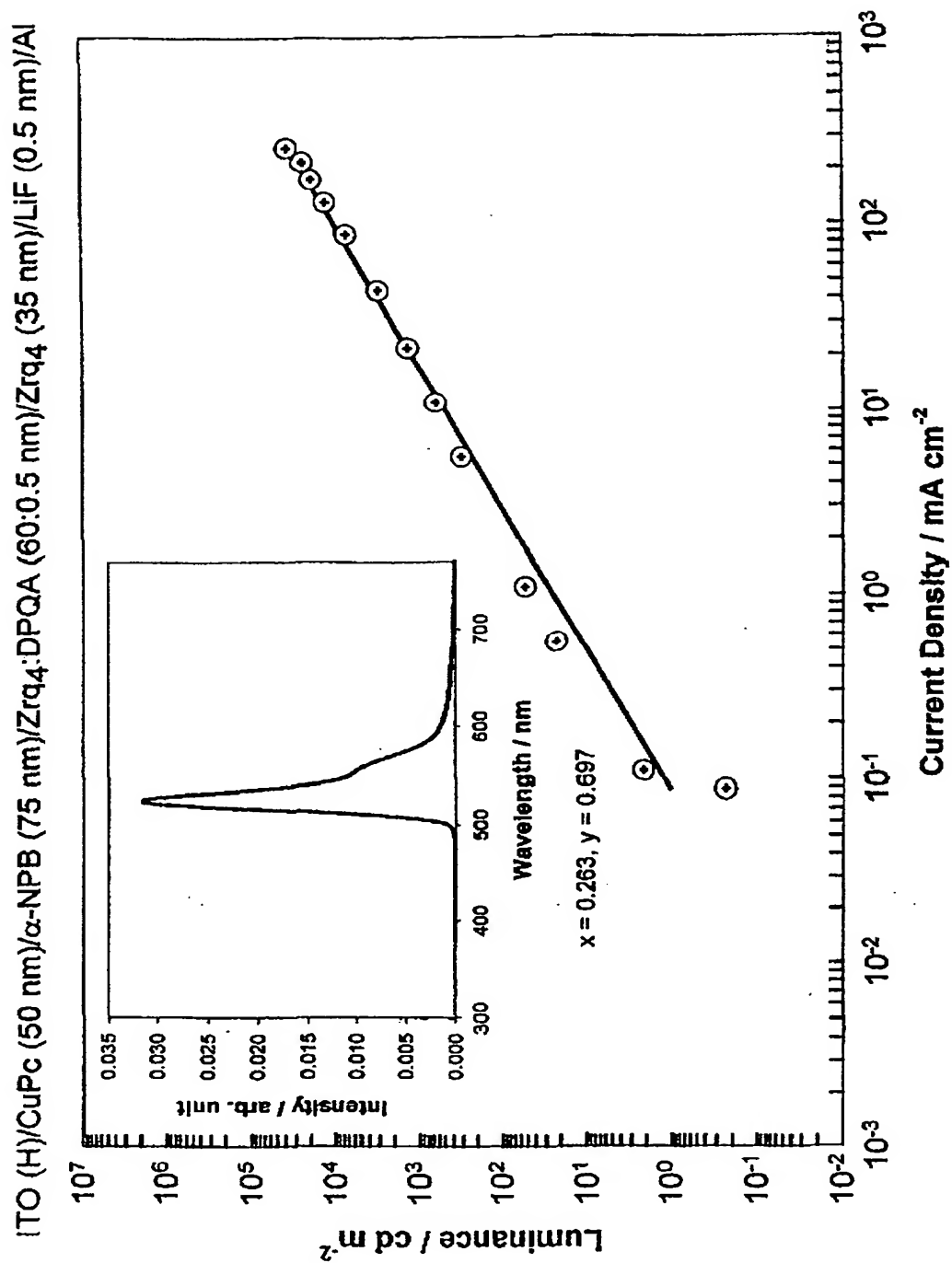


Fig. 33

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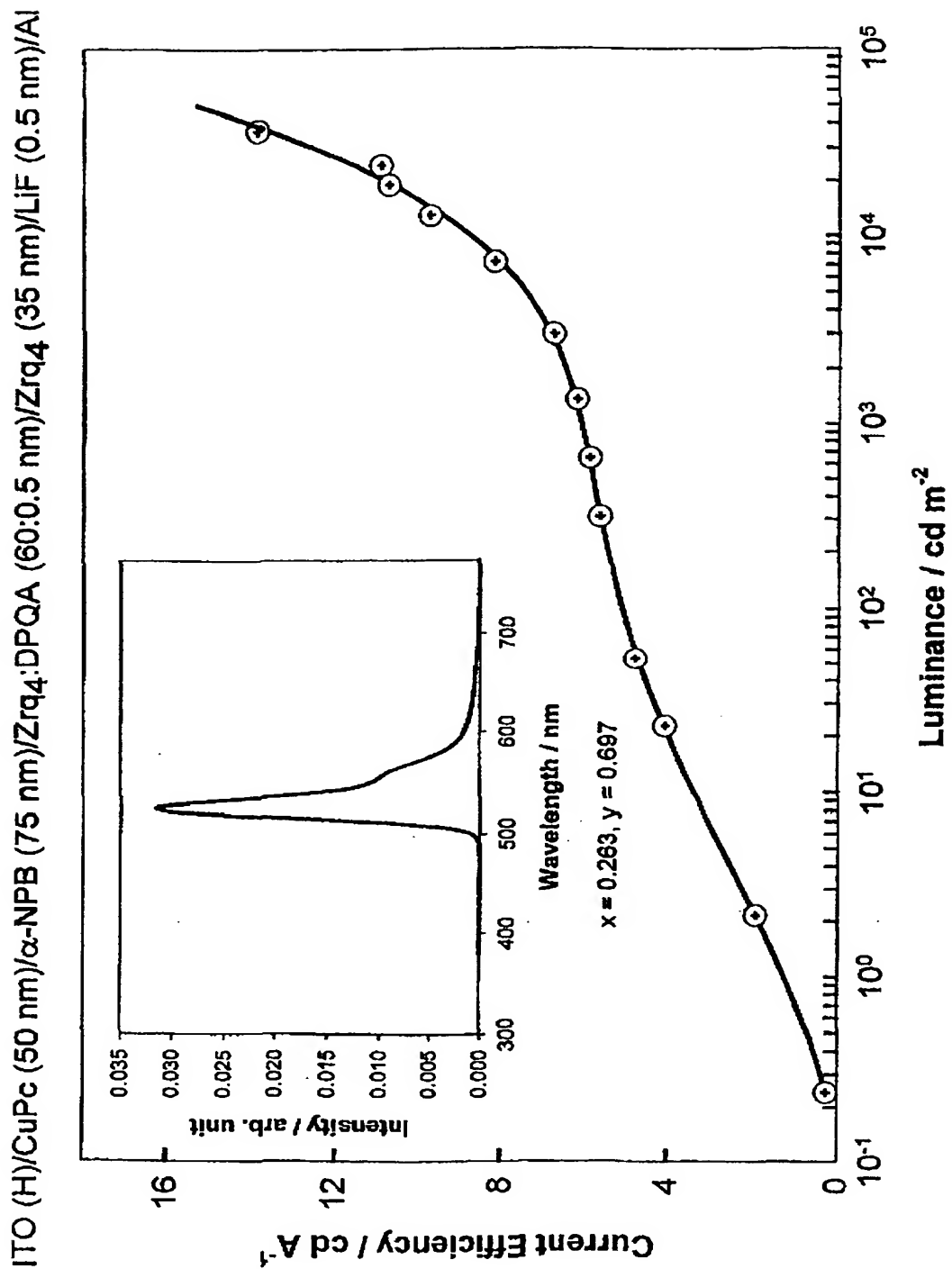


Fig. 34

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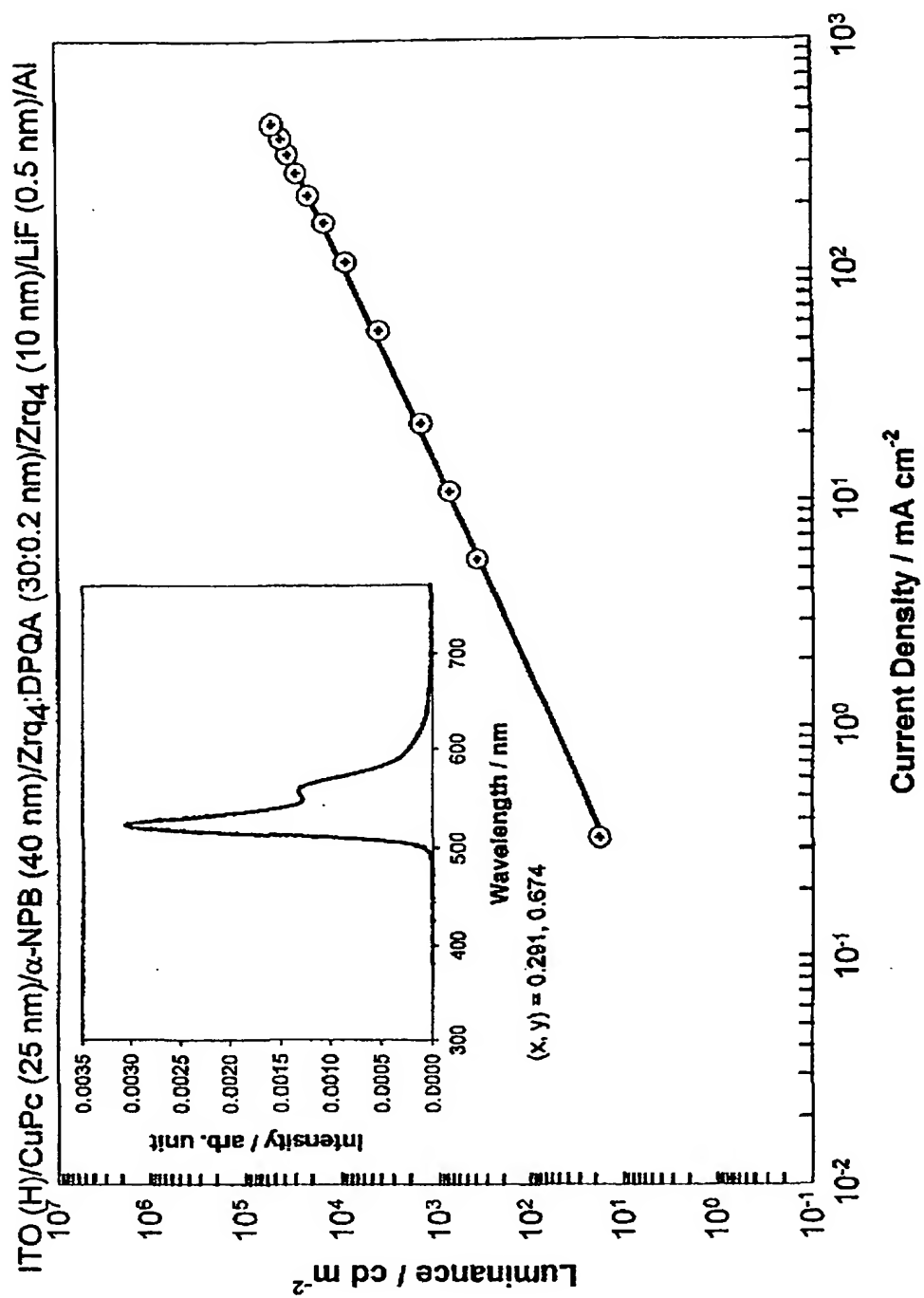


Fig. 35

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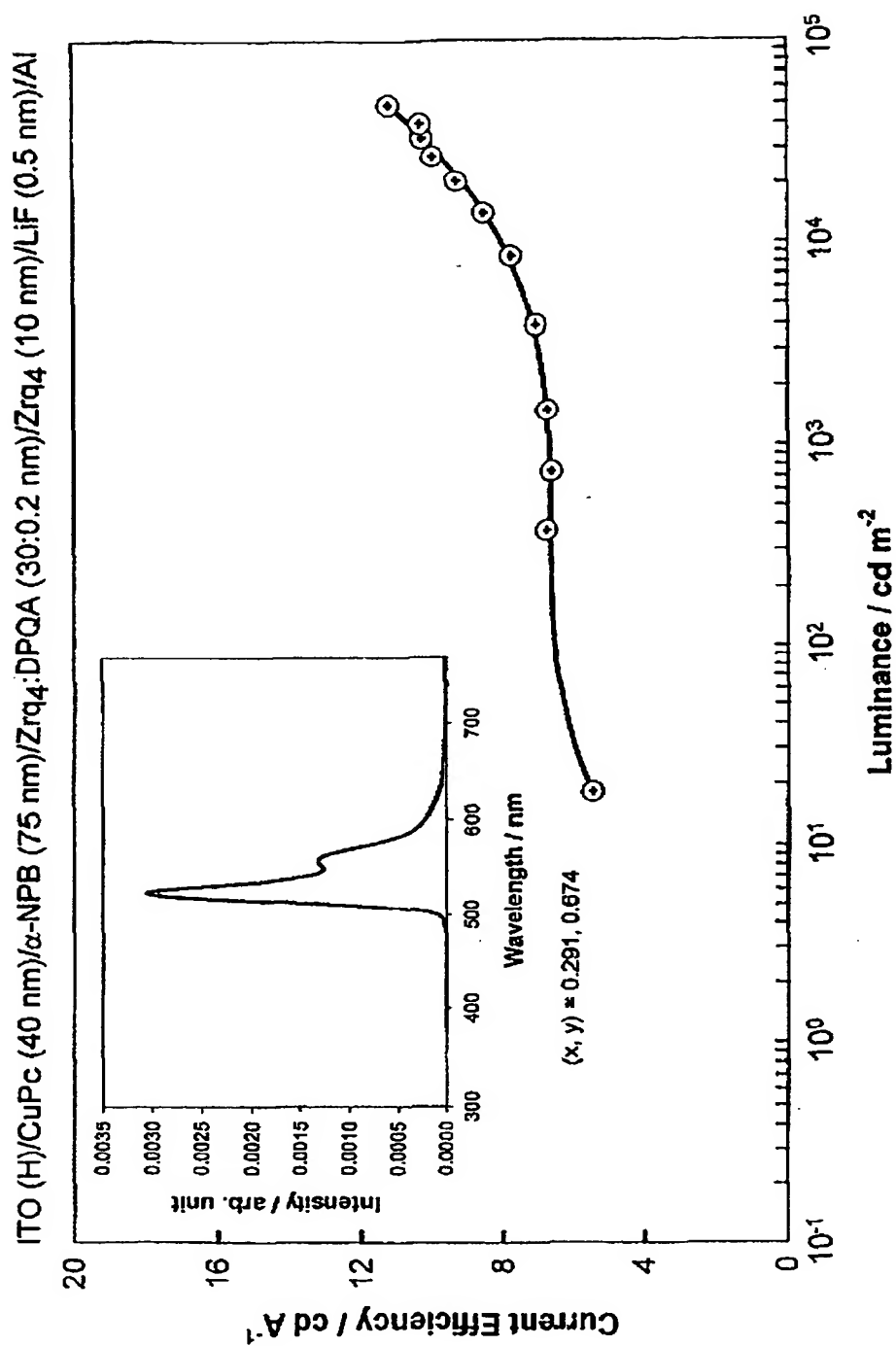
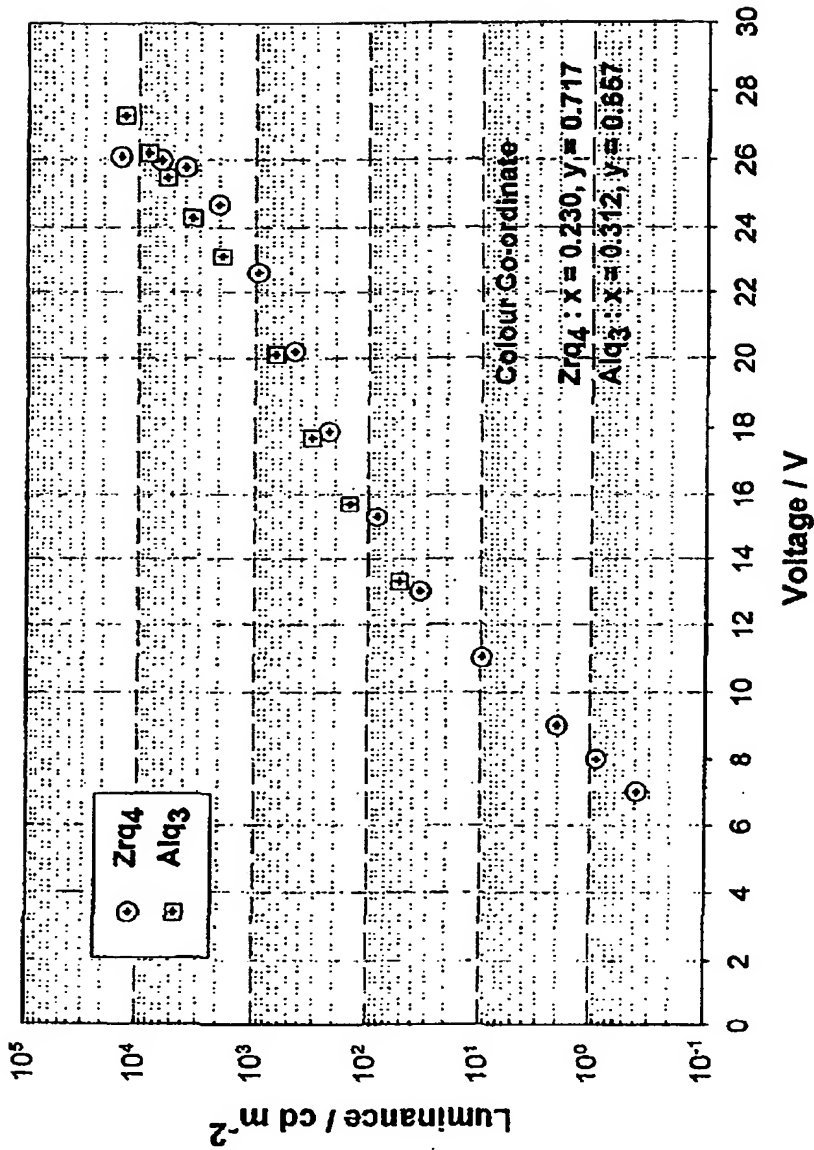


Fig. 36

Comparison of Doped Zrq4 Device with Doped Alq3 Device



ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Alq3 : DPQA (75 : 0.76 nm)/Alq3 (10 nm)/LIF (0.4 nm)/Al

ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Zrq4 : DPQA (80 : 0.8 nm)/Zrq4 (10 nm)/LIF (0.4 nm)/Al

Fig. 37

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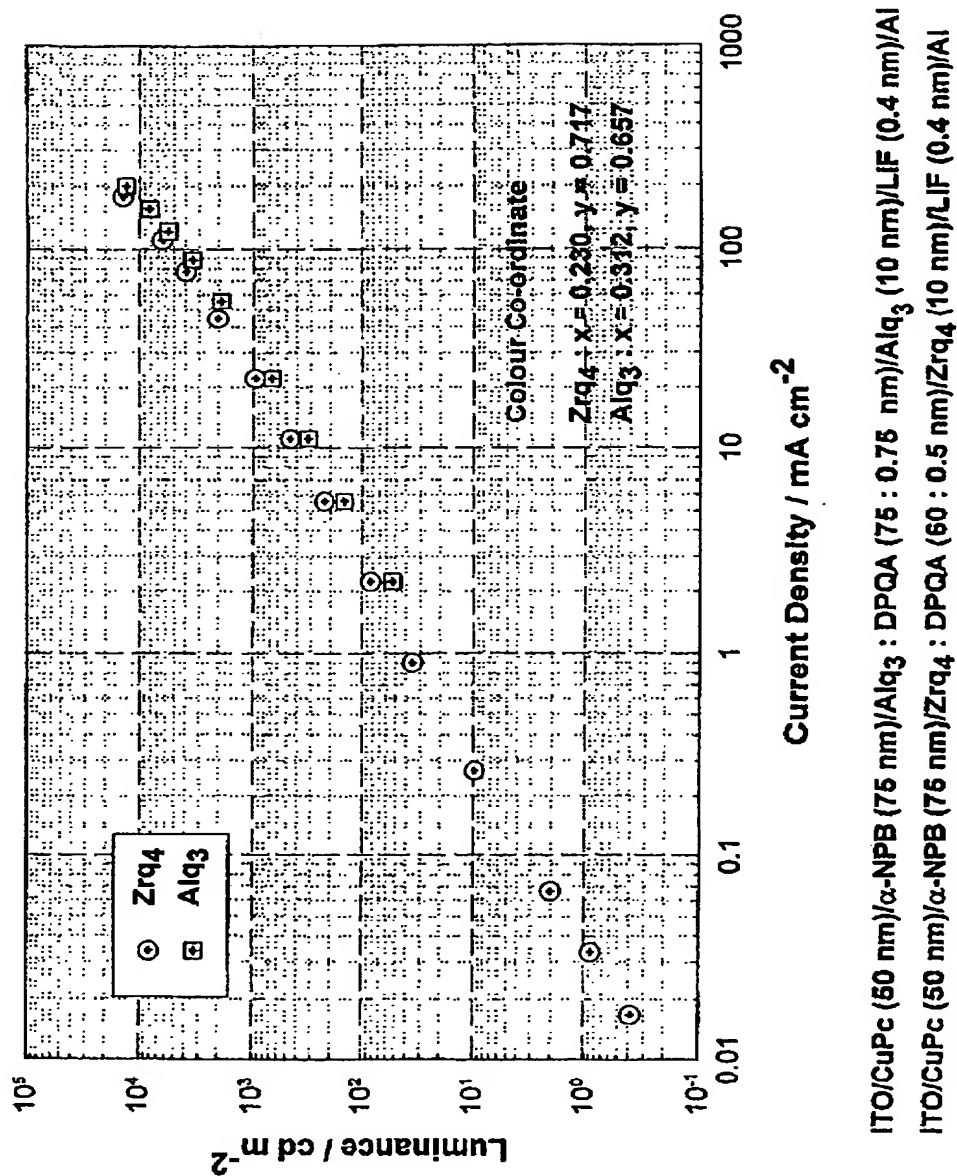
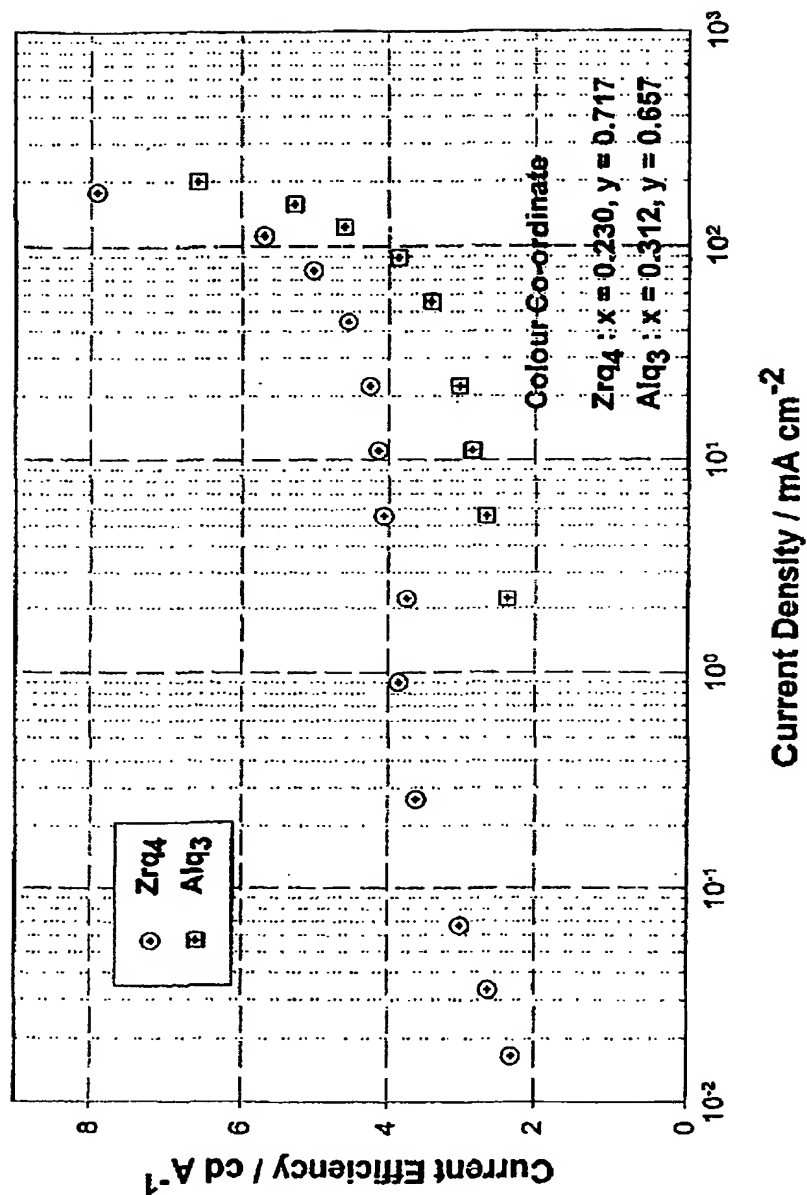
Comparison of Doped Zrq<sub>4</sub> Device with Doped Alq<sub>3</sub> Device

Fig. 38

ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Alq<sub>3</sub> : DPQA (75 : 0.75 nm)/Alq<sub>3</sub> (10 nm)/LIF (0.4 nm)/Al  
 ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Zrq<sub>4</sub> : DPQA (60 : 0.5 nm)/Zrq<sub>4</sub> (10 nm)/LIF (0.4 nm)/Al

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## Comparison of Doped Zrq4 Device with Doped Alq3 Device

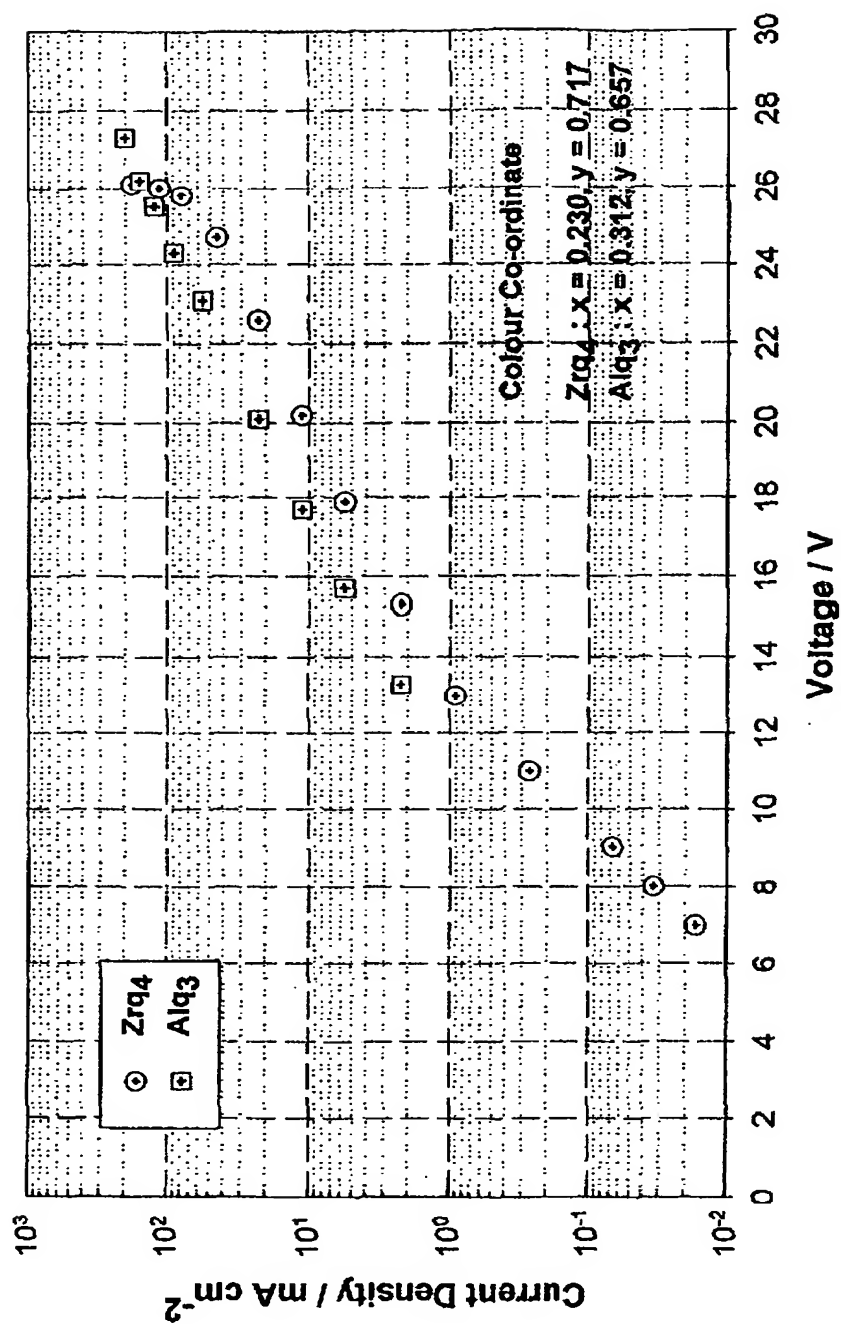


ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Alq3 : DPQA (75 : 0.75 nm)/Alq3 (10 nm)/LiF (0.4 nm)/Al

ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Zrq4 : DPQA (60 : 0.5 nm)/Zrq4 (10 nm)/LiF (0.4 nm)/Al

Fig. 39

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Comparison of Doped Zrq<sub>4</sub> Device with Doped Alq<sub>3</sub> Device

ITO/CuPc (50 nm)/α-NPB (75 nm)/Alq<sub>3</sub> : DPQA (75 : 0.75 nm)/Alq<sub>3</sub> (10 nm)/LiF (0.4 nm)/Al

ITO/CuPc (50 nm)/α-NPB (75 nm)/Zrq<sub>4</sub> : DPQA (60 : 0.5 nm)/Zrq<sub>4</sub> (10 nm)/LiF (0.4 nm)/Al

Fig. 40



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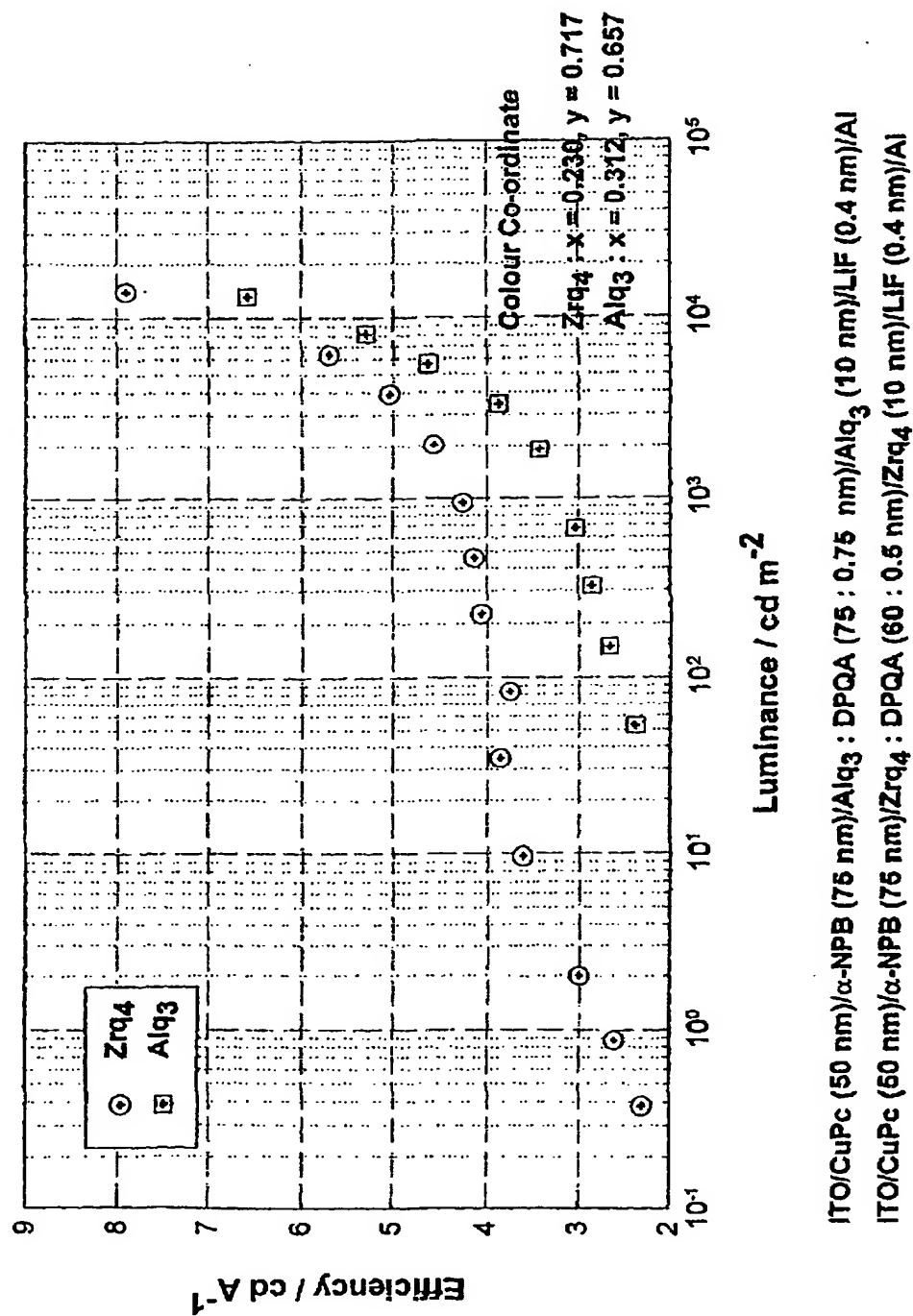
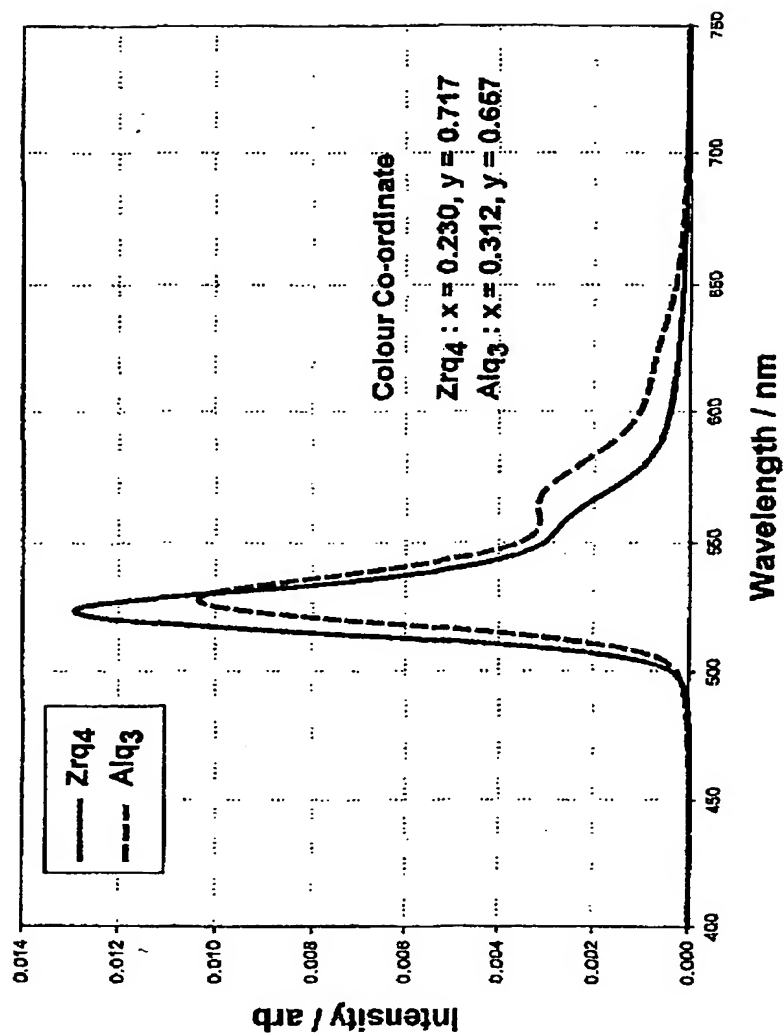
Comparison of Doped Zrq<sub>4</sub> Device with Doped Alq<sub>3</sub> Device

Fig. 41

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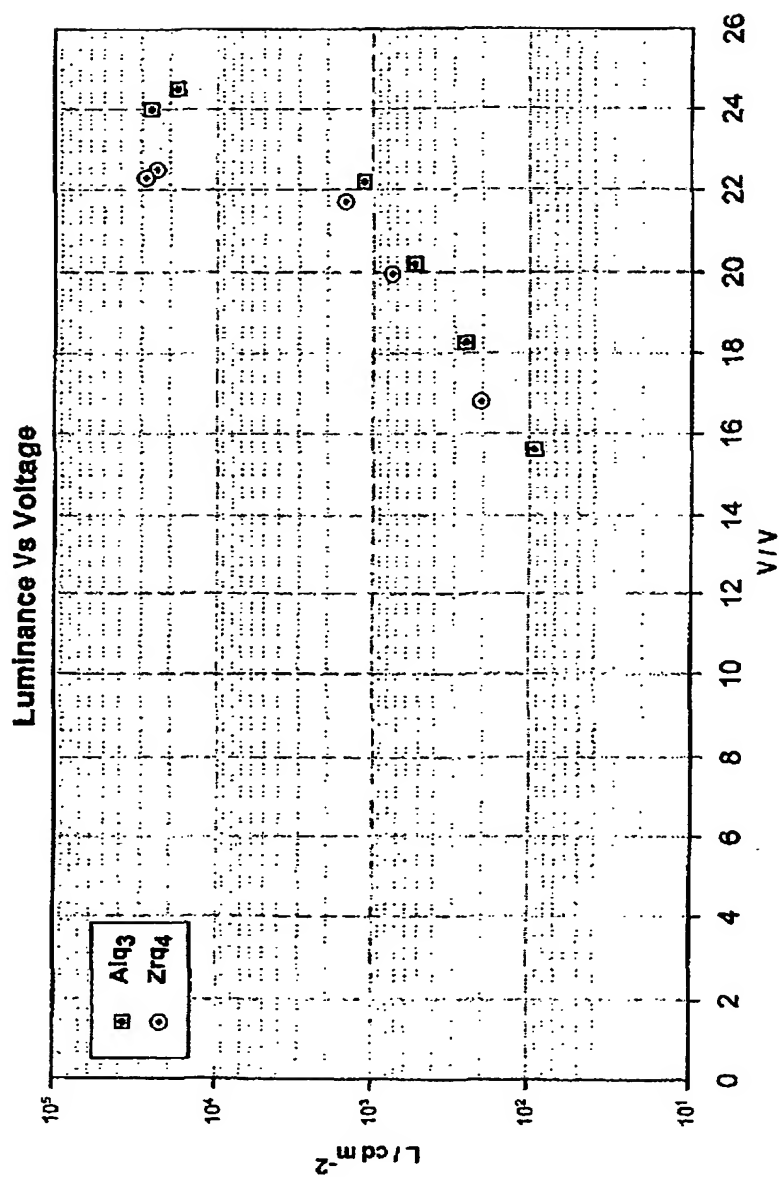
Comparison of Doped Zrq<sub>4</sub> Device with Doped Alq<sub>3</sub> Device

ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Alq<sub>3</sub> : DPQA (75 : 0.75 nm)/Alq<sub>3</sub> (10 nm)/LiF (0.4 nm)/Al  
 ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Zrq<sub>4</sub> : DPQA (60 : 0.5 nm)/Zrq<sub>4</sub> (10 nm)/LiF (0.4 nm)/Al

Fig. 42

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# Comparison of Doped Alq<sub>3</sub> Device with Doped Zrq<sub>4</sub> Device



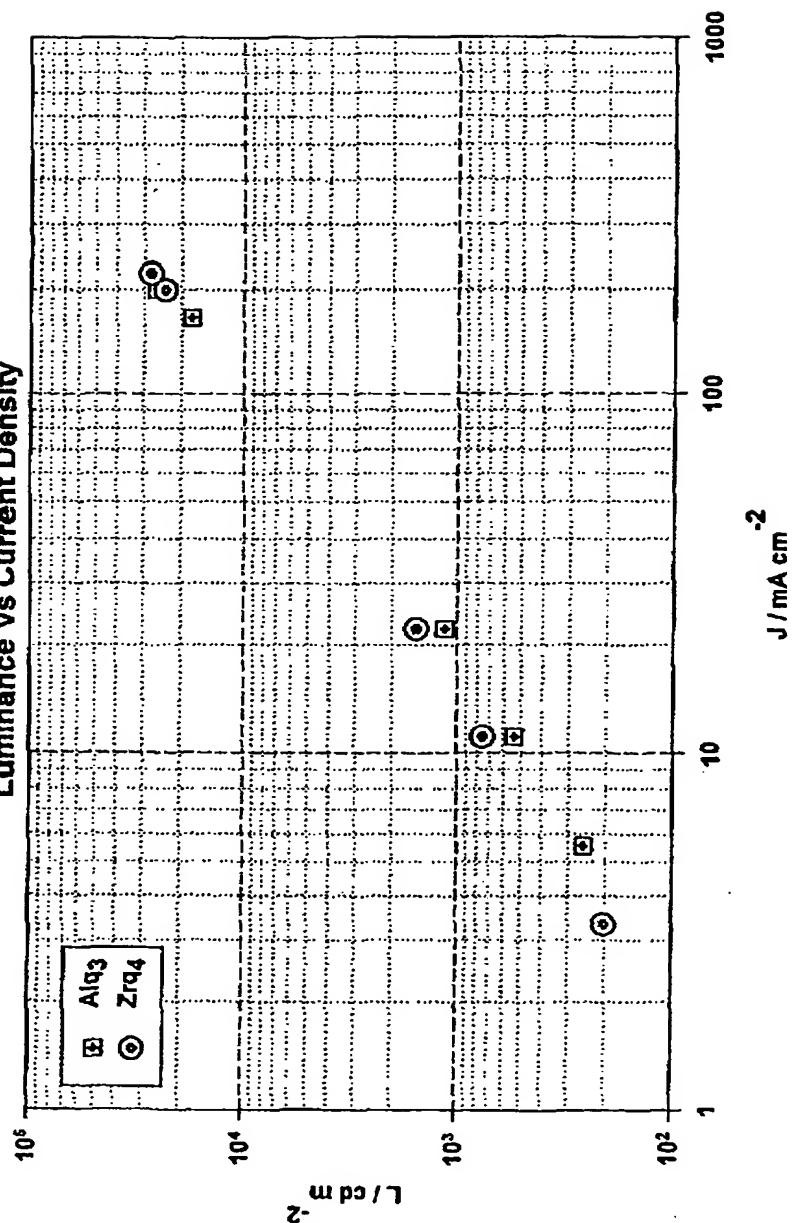
ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Alq<sub>3</sub>:DPQA (75:0.75 nm)/Alq<sub>3</sub> (10 nm)/LiF (0.2 nm)/Al  
 ITO/CuPc:TPTP (15:15 nm)/ $\alpha$ -NPB (75 nm)/Zrq<sub>4</sub>:DPQA (60:0.5 nm)/LiF (0.2 nm)/Al

Fig. 43

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Comparison of Doped Alq<sub>3</sub> Device withDoped Zrqa<sub>4</sub> Device

Luminance Vs Current Density



ITO/CuPc (50 nm)/α-NPB (75 nm)/Alq<sub>3</sub>:DPQA (75:0.75 nm)/Alq<sub>3</sub> (10 nm)/LiF (0.2 nm)/Al  
 ITO/CuPc:TTP (15:15 nm)/α-NPB (75 nm)/Zrqa<sub>4</sub>:DPQA (60:0.5 nm)/LiF (0.2 nm)/Al

Fig. 44

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# Comparison of Doped Alq<sub>3</sub> Device with Doped Zrq<sub>4</sub> Device

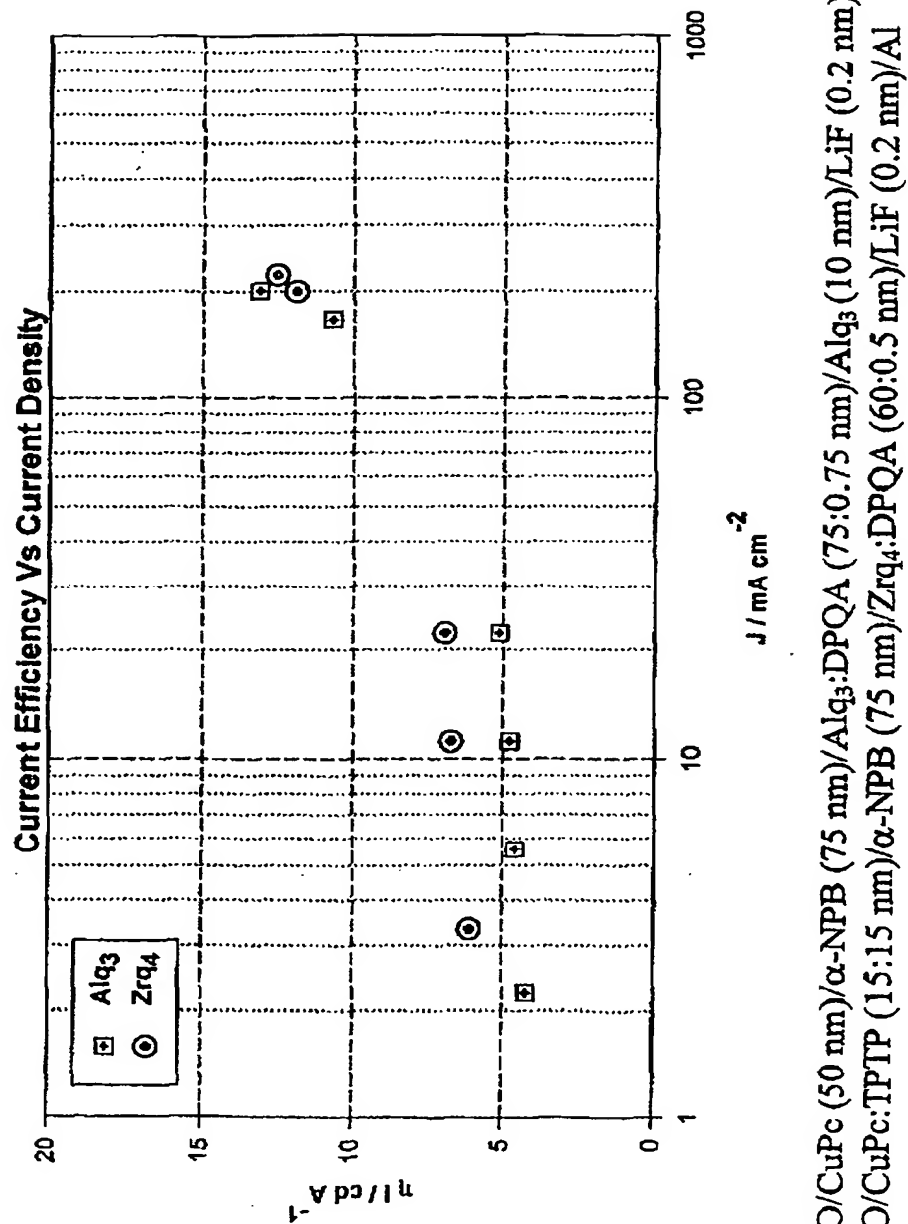
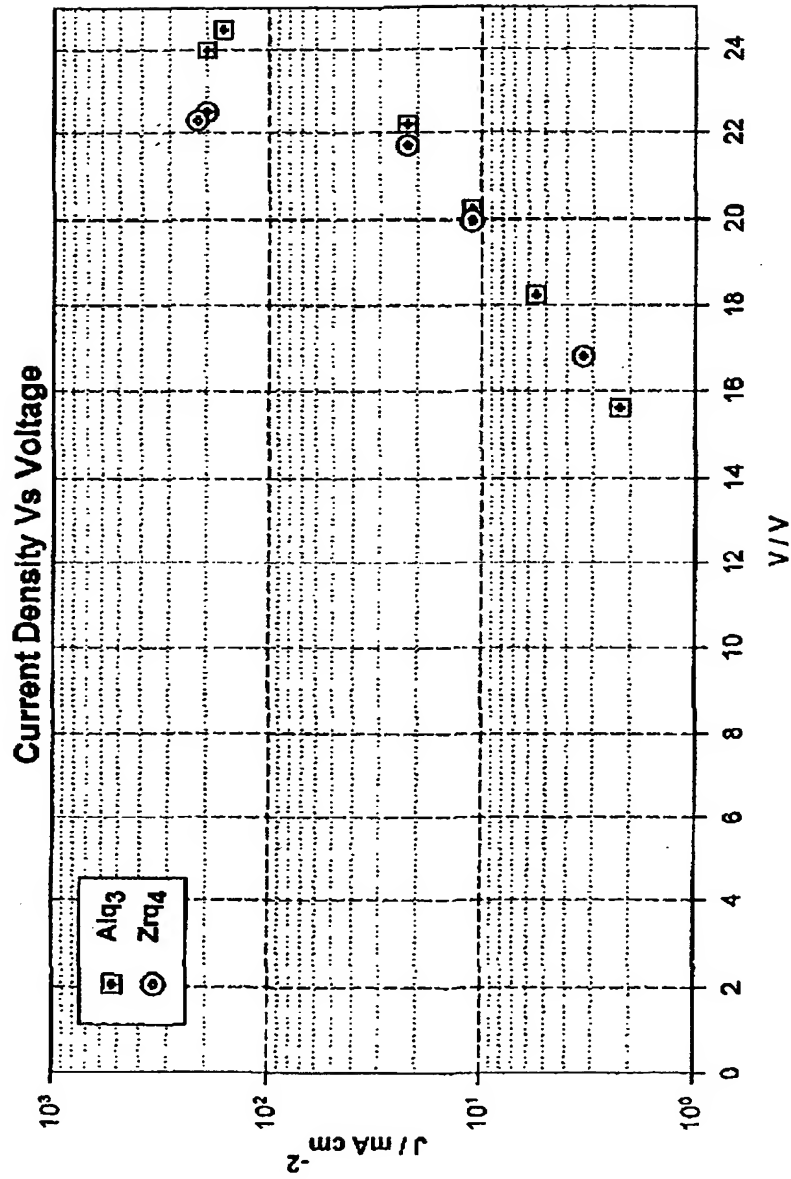


Fig. 45

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# Comparison of Doped Alq<sub>3</sub> Device with Doped Zrqr<sub>4</sub> Device

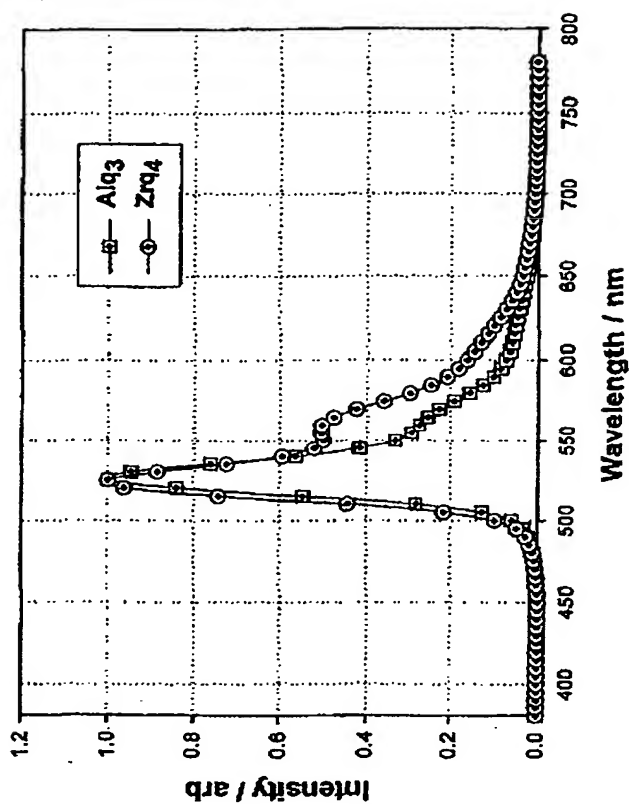


ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Alq<sub>3</sub>:DPQA (75:0.75 nm)/Alq<sub>3</sub> (10 nm)/LiF (0.2 nm)/Al  
 ITO/CuPc:TPTP (15:15 nm)/ $\alpha$ -NPB (75 nm)/Zrqr<sub>4</sub>:DPQA (60:0.5 nm)/LiF (0.2 nm)/Al

Fig. 46

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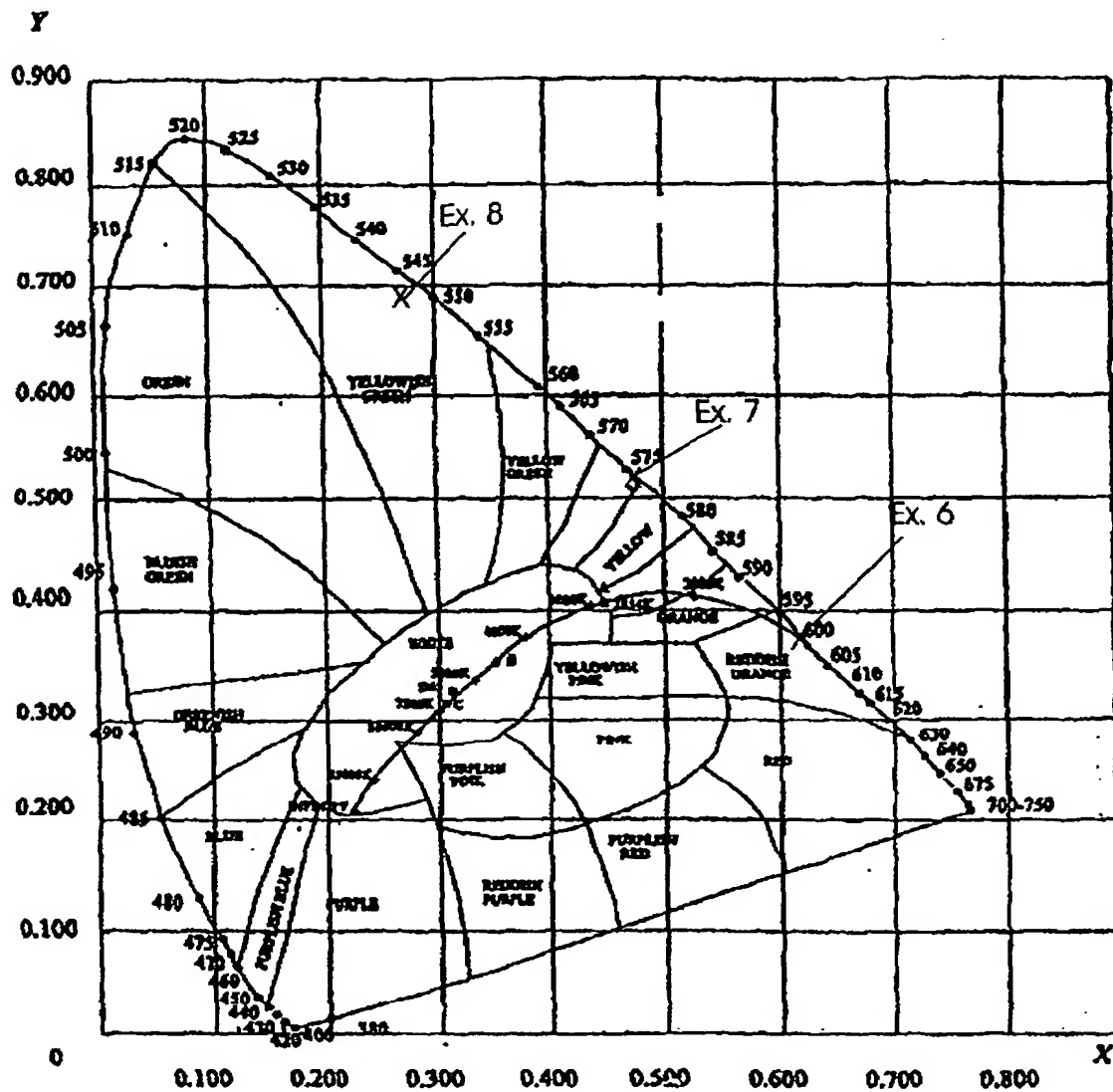
# Comparison of Doped Alq<sub>3</sub> Device with Doped Zrq<sub>4</sub> Device



ITO/CuPc (50 nm)/ $\alpha$ -NPB (75 nm)/Alq<sub>3</sub>:DPQA (75:0.75 nm)/Alq<sub>3</sub> (10 nm)/LiF (0.2 nm)/Al  
 ITO/CuPc:TPTP (15:15 nm)/ $\alpha$ -NPB (75 nm)/Zrq<sub>4</sub>:DPQA (60:0.5 nm)/LiF (0.2 nm)/Al

Fig. 47

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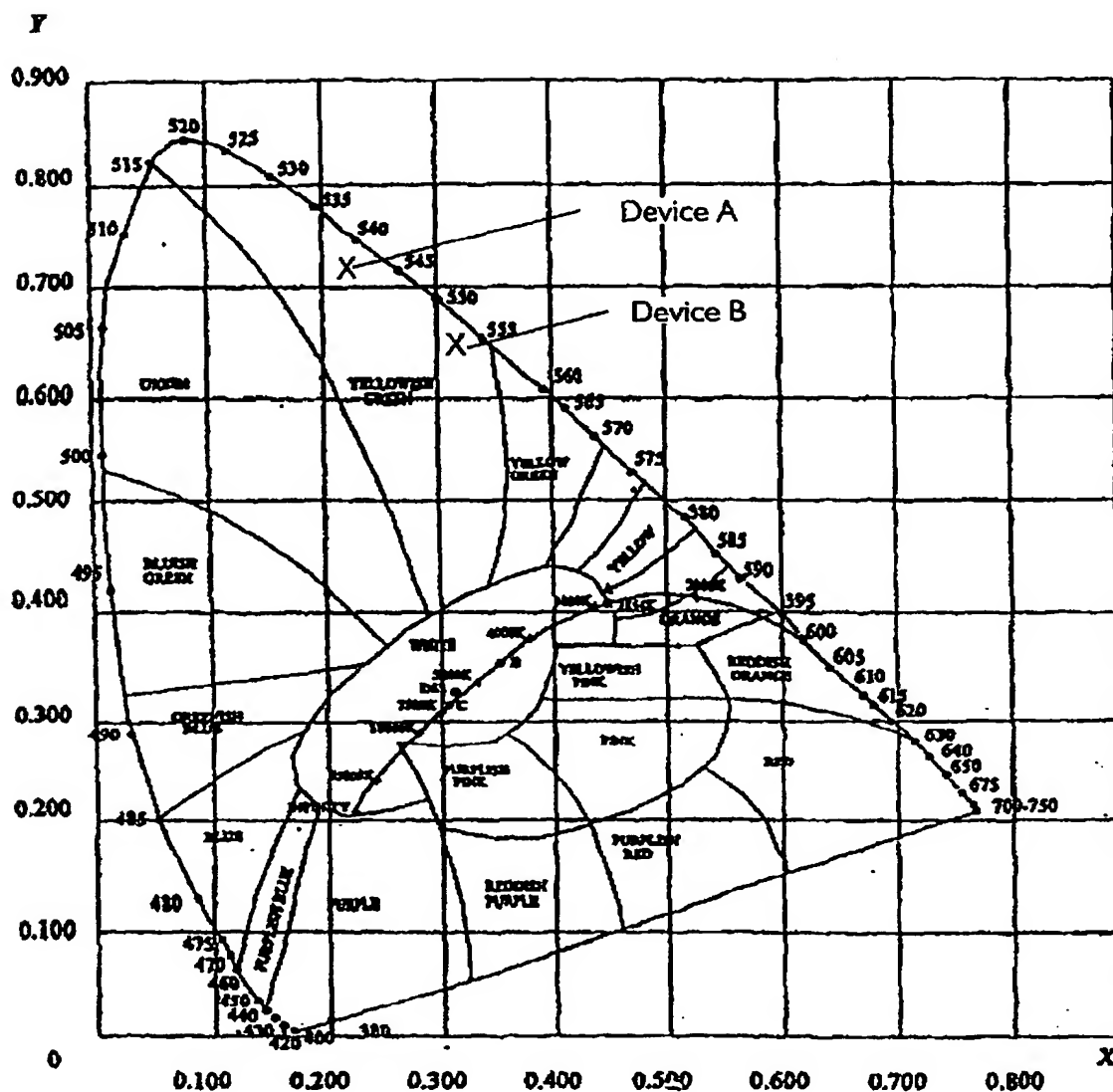


CIE 1931 x,y chromaticity diagram showing approximate position of perceived colours

Fig. 48



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CIE 1931 x,y chromaticity diagram showing approximate position of perceived colours

Fig. 49

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